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An Evaluation of an Interactive Computerized Training to Teach Instructors How to Respond During an Active Shooter Situation

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AN EVALUATION OF AN INTERACTIVE COMPUTERIZED TRAINING TO TEACH INSTRUCTORS HOW TO RESPOND DURING AN ACTIVE SHOOTER SITUATION

by

Lorraine A. Becerra

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ABSTRACT

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by

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The occurrence of active shooter events are on an increasing trend, with the largest percent of active shooter incidents having been reported to take place in a commercial environment, followed by educational environments, and then healthcare facilities. There is some evidence to suggest that active shooter events are on an increasing trend, suggesting that educators need to be prepared for these situations. Educators are in a unique position during active shooter events compared to the general public as they must decide to prioritize actions that will lead to their own safety or actions that would protect their students. Depending on the circumstances of the situation, the educator should engage in a run, hide, or fight response. Issues related to a student's particular disability may create additional barriers to these already challenging emergency situations for educators. Interactive computerized training (ICT) is a successful training method to teach educators implement instruction to individuals with

autism spectrum disorder (ASD). The purpose of this study was to extend the literature on ICT by investigating its effects on teaching educational staff who work with children diagnosed with ASD. All participants met criterion of 90% or higher fidelity across five sessions within the Run and Hide checklists. Fidelity continued to meet criterion after a 2-week follow up. Furthermore, all participants indicated that they enjoyed the modularized training materials relative to the written materials. Potential limitations and future directions related to ICT and safety skills training are discussed.

(120 pages)

PUBLIC ABSTRACT

An Evaluation of an Interactive Computerized Training to Teach Instructors How to Respond During an Active Shooter Situation

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Active shooter events in the U.S. are occurring more often in commercial environment and schools. In these emergency situations educators must quickly decide to complete actions that will protect themselves and their students. Typically, during these situations, the educator should complete in a run, hide, or fight sequence of behaviors. The educator must also consider challenges for their student's particular disabilities during these situations. Interactive computerized training (ICT) may be one easy method to teach educators these procedures. The purpose of this study was to explore the effectiveness of interactive computerized training to help educators learn how to respond during two active shooter situations when caring for an individual with autism spectrum disorder. After completing the 90 min interactive computerized training, all educators responded correctly to each type of active shooter situation. These correct responses continued after a 2-week period without practice.

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Lorraine A. Becerra

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CHAPTER I

INTRODUCTION

Across the last decade, emergency situations and disasters are on the rise (Murray, 2011; Neumayer, & Plumper, 2007). Emergency situations can include earthquakes, floods, tornados, hurricanes, terrorist attacks, and active shooter events. According to Chung, Danielson, and Shannon (2008), while many healthcare and educational settings practice evacuation drills for fires and protective measures for natural disasters, few of those organizations plan for active shooter situations.

According to the U.S. Department of Homeland Security (2008), an active shooter is an individual actively engaged in killing or attempting to kill people using firearms in a confined and populated area. More restrictive definitions state that mass shooting incidents are those in which four or more people, excluding the shooter(s), are shot in the same general time period and area (Robinson, Gould, & Lee, 2018). Although firearm-related injury is the second leading cause of deaths for children and adolescents, mass shootings conducted by active shooters in school settings entails less than 1% of incidences (Cunningham, Walton, & Carter, 2018). The largest percent of active shooter incidents take place in a commercial environment, followed by educational environments, and healthcare facilities (U.S. Department of Justice, 2013). The most recent statistics report 307 active shooter situations in the U.S. during 2018 alone (Robinson et al., 2018). Although there is some evidence to suggest an increase in the occurrence of active shooter events (Dagenhard, Thompson, Dake, Pescara-Kovach, & Rega, 2019), any occurrence of active shooter events in an educational setting provides cause to prepare for

such incidences (Federal Commission on School Safety, 2018).

Educators need to be prepared to manage active shooter situations, at least until law enforcement arrives (Chunget al., 2008; U.S. Department of Homeland Security, 2008). In previously documented active shooter situations, the event typically ends within 10 to 15 minutes, after law enforcement arrive on the scene (Dagenhard et al., 2019). Because active shooter events are unpredictable and evolve quickly, there is no single method to respond effectively (Federal Commission on School Safety, 2018). However, trainings designed and delivered by employers may provide the opportunity to practice responding to situational variables within the environment, commit to an action plan, and increase the probability of survival (Dagenhardet al., 2019; Federal Commission on School Safety, 2018).

During an active shooter situation, the noise from alarms, gunfire, and people screaming can cause an emotional response of fear or anxiety that prevents individuals from relocating to a safer area (Healthcare & Public Health Sector Coordinating Council, 2017; Shyam-Sunders et al., 2005).

Particularly challenging are the ethical considerations educators and healthcare providers must navigate within seconds of active shooter notification. Educators must decide to prioritize actions that will lead to their own safety or actions that would protect their students or patients. Specifically, in healthcare and educational settings, difficult questions of client, visitor, and personal safety, duty to act, and abandonment need to be addressed (Healthcare & Public Health Sector Coordinating Council, 2017).

Active Shooter Responses: Run, Hide, Fight

According to the U.S. Department of Homeland Security (2008), to reduce the risk during an active shooter situation, it is important for the educator to quickly determine the most reasonable way to protect their own, and their client's life (Federal Commission on School Safety, 2018). Depending on the circumstances of the situation, the educator should engage in a Run, Hide, or Fight response. In some situations, a combination of one or more of those responses is needed (U.S. Department of Homeland Security, 2008; Healthcare & Public Health Sector Coordinating Council, 2017).

Run Response

In active shooter situations, it is important to respond immediately. If, or when, it is safe to do so, the first suggested course of action for educators and their students is to run out of the building and attempt to evacuate the premises, if possible. The best way to save lives is to remove potential targets from the shooter's vicinity and reduce the number of people in harm's way (Dagenhard et al., 2019; Healthcare & Public Health Sector Coordinating Council, 2017). The U.S. Department of Homeland Security (2008) suggests that educators who engage in the Run response implement the following procedures: (a) evacuate regardless of whether others agree to follow, (b) help others escape, (c) if possible, but do not stay behind because others will not go, (d) plan an escape route, (e) leave personal belongings behind, (f) prevent other individuals from entering an area where the active shooter is reported to be located, (g) while running keep hands visible, (h) follow instructions from law enforcement officials, (i) do not attempt to

move wounded individuals, (j) call 911 when safe. Although these general procedures are informative, they do not address the specifics of how the instructor should travel with their student, to where the educator and students should evacuate, or what supplies are necessary for the student to take during this situation.

Hide Response

If evacuating the room or building is not possible, the recommendation is to find a location to engage in the Hide response, where the active shooter is least likely to find them. Barricading oneself behind a locked door may be a successful method to prevent shooters from entering and redirect them to locate rooms without these barriers (Dagenhardet al., 2019). While hiding, the educator should be prepared to run when it becomes safe to do so. The hiding place they select should include the following: (a) thick walls, (b) minimal windows, (c) out of the active shooter's view, (d) behind protection if shots are fired, (e) provides options for further movement (Federal Commission on School Safety, 2018). Additionally, the Healthcare and Public Health Sector Coordinating Council (2017) suggests that the location also contain first-aid emergency kits and communication devices. Crisis kits should contain items such as radios, floor plans, employee roster, educator and parent emergency contact numbers, first aid kits, and flashlights (Department of Homeland Security, 2008). While the general suggestions on this list seem reasonable, items related to the disability specific needs of younger students with autism are not included (e.g., sanitary items such as diapers or wipes, noise reducing ear phones, entertainment, snacks, etc.). Next, the educator should prevent the active shooter from entering the hiding place by arranging the environment in

the following ways: (a) lock the door, (b) block the door with heavy furniture, (c) block doors with doorstops, (d) lock and block windows from allowing others to view inside, (e) turn off lights, (f) turn off any source of noise (e.g., phones, radios, televisions), (g) remain silent. Although these actions are easily completed by adults, closing the lights, remaining in a hiding location, and requiring students with autism to remain silent may be more of a challenge without prior planning. Additionally, the spreading of hiding locations for multiple individuals in one location is not described.

Fight Response

As a last resort, and only when the educator's life is in imminent danger, the U.S. Department of Homeland Security (2018) suggests attempting to disrupt and incapacitate the active shooter by using aggressive force and items in the environment, such as fire extinguishers and chairs. Confronting an active shooter should never be a requirement of any educator, however. When faced with this situation, each individual may choose his or her own method to respond (Healthcare & Public Health Sector Coordinating Council, 2017). If an individual chooses to Fight, they are recommended to: (a) act as aggressively as possible against the shooter, (b) throwing items and improvising weapons, (c) yell, and (d) commit to their actions. As with the previous responses (i.e., Run and Hide), the placement and role of students with disabilities during these actions was not discussed in the literature (Federal Commission on School Safety, 2018).

While the general recommendations of Run, Hide, or Fight are a good start for developing an emergency plan in educational settings, the creation of specific protocols for addressing the unique needs of children with autism in active shooter situations seems

necessary followed by educator training to ensure that educational staff can follow designed emergency protocols.

An emphasis should be placed on plans that prepare for vulnerable populations. Certain inherently vulnerable groups, such as children and those with disabilities are set to be more seriously impacted by disasters (Aldrich & Benson, 2008; Balbus & Malina, 2009; Boon et al., 2011; Cutter, Boruff, & Shirley, 2003; Neumayer & Plumper, 2007; Peek & Stough, 2010). This places almost 9.2% of school-aged population, and their educators, at an additional risk (Brault, 2008; U.S. Department of Education, 2009). Reports indicate that children with disabilities may be less likely to leave the threatening area on their own, putting them in a greater risk (Dash & Gladwin, 2007; Martin & Mims, 2009; Peek & Stough, 2010). The reason for this may be because emergency situations can involve extreme visual and auditory stimulation, as well as the presence of strangers including emergency personnel (Scotti et al., 2007).

Autism Spectrum Disorder

Issues related to a student's particular disability may create additional barriers to already challenging emergency situations for educators. To date, the majority of current research has focused on vulnerabilities with mobility during emergency situations (Edmonds, 2017; Murray, 2011; Peek & Stough, 2010; Taylor, Hughes, Richard, Hoch, & Coello, 2004), while there is little research that addresses barriers for other disabilities, such as people with autism (Federal Commission on School Safety, 2018; Edmonds, 2017). This may be one reason why emergency personnel have a limited knowledge of

disability, and as such do not readily include people with disabilities in their own emergency plans (Fox, White, Rooney, & Rowland, 2007; Rowland, White, Fox, & Rooney, 2007).

Autism spectrum disorder (ASD) is commonly a comorbid diagnosis with other developmental disorders (Chen et al., 2015; MacNeil & Mostofsky, 2012; Mannion & Leader, 2013) and often associated with learning disabilities (Barnard, Muldoon, Hasan, O'Brien, & Stewart, 2008; Gillberg & Coleman, 2000). A diagnosis of ASD includes social/emotional difficulties; language/ communication difficulties; and difficulties with flexibility of thought (American Psychiatric Association [APA], 1994). Impairments of this disorder focus on two main areas; social communication and interaction; and restricted, repetitive patterns of behavior, interest or activities (APA, 2013).

The specific challenges facing students with autism can be difficult for educators to anticipate and manage in emergency situations, without prior planning. Potential impairments of communication related to autism can affect how quickly a student becomes aware of a disaster, their access to emergency information during a disaster, and their ability to request assistance (Campbell, Gilyard, Sinclair, Sternberg, & Kailes, 2009, Loy & Batiste, 2004). Compared to their peers, children with ASD engage in less adaptive responses (e.g., communication, daily living, socialization and motor skills) during and after the emergency event (Valenti et al., 2012). Additionally, the challenges associated with restricted or repetitive behaviors may make emergency situations difficult for individuals with autism to respond flexibly with little or no prior warning (Kailes & Enders, 2007; Scotti et al., 2007). These individuals can be particularly vulnerable in the

high-stimulation emergencies and disasters (Self, Scudder, Weheba, & Crumrine, 2007) and may rely more on their parents or caregivers, than other typically developing children (due to their differences) and this may be especially so within the school environment (Edmonds, 2017).

Educators who work with individuals diagnosed with ASD, may be less likely to have evacuation plans in place (Spence, Lachlan, Burke, & Seeger, 2007). Given that situations involving an active shooter in the healthcare and educational settings can have a devastating impact on victims and co-workers alike, as well as long-term organizational effects (Healthcare & Public Health Sector Coordinating Council, 2017), it is essential that children and adults with cognitive disorders are considered when preparing for emergencies (Edmonds, 2017). It is important to increase the research on preparedness for responding to emergency situations in a method customized for the student's abilities and needs, the instructor's knowledge and resources, as well as the structure of the organization's facilities (Hulme, 2008).

It is paramount that educators receive high quality training on the implementation of safety protocols (Dagenhardet al., 2019) that involve practicing the actions within the environments they will take place (Federal Commission on School Safety, 2018). Without these safety trainings, students with autism may be faced with life threatening situations, for which educators are not prepared to encounter. One method that has been effective at teaching safety skills to children and educators, which includes practicing the safety actions, is behavioral skills training (BST; Harriage, Blair, & Miltenberger, 2016; Nabeyama, & Sturmey, 2010). The BST training package includes the following

components: instruction, modeling, rehearsal, and feedback. Trainees are taught using these components until they meet a specified criterion. This training package, or combinations of these components, have been demonstrated effective in the literature to teach instructors discrete trial instruction (Downs, Downs, & Rau, 2008; Lafasakis & Sturmey, 2007; Sarokoff & Sturmey, 2004), as well as implementation of safety protocols (Harriage et al., 2016; Nabeyama, & Sturmey, 2010), among other skill sets. However, the accessibility of this information and the time required to train educators may be too costly for some organizations to obtain. Therefore, an alternative cost-effective training method may be needed to teach educators who work with children diagnosed with autism how to prepare for implementation of safety protocols. One such alternative is called interactive computerized training (ICT).

Interactive Computerized Training

Interactive computerized training (ICT) is a treatment package composed of a combination of asynchronous training components (e.g., narrated slides, interactive competency questions, activities, video models, self-paced information). Furthermore, this training modality uses competency checks and interactive activities that are embedded in the training to demonstrate the educator's acquisition of the content. ICT procedures allows for more educators to access the training content and offers the flexibility to complete the training from any location and at the learners preferred pace. These methods are particularly efficient because they do not require a professional and trainee to be simultaneously present for instruction to occur.

Interactive computerized training packages are delivered via web-based course platforms. Included in the training are narrated slides, graphics, and video examples with voiceover narration. In addition, competency checks and interactive activities (e.g., prompted self-guided practice opportunities) are typically embedded to provide the trainee with an opportunity to receive feedback on the content and to practice the taught skill. In the research literature, this training format has been used to teach instructors about naturalistic teaching procedures (McCulloch & Noonan, 2013; Wainer & Ingersoll, 2013), and Discrete Trial Instruction (Nosik, Williams, Garrido, & Lee, 2013; Pollard, Higbee, Akers, & Brodhead, 2014).

In summary, given the increasing trend of active shooter incidences in educational settings (U.S. Department of Justice, 2013), the prevalence of ASD (Centers for Disease Control, 2014), and the increasing number of students receiving special education service (O'Conner, De Feyter, Carr, Luo, & Romm, 2017), there is a growing demand for well-trained educators who are taught to implement active shooter safety protocols, with fluency (Federal Commission on School Safety, 2018). Therefore, there is a high demand to develop efficient and economical training procedures to teach educators, explaining how to respond to active shooter emergency situations when caring for a student with autism. Behavioral skills training and interactive computerized training procedures have both been demonstrated to be effective at training educators to implement behavioral procedures. Whether or not these staff training methods will be effective at teaching educators how to follow safety protocols, however, is an open question that requires further examination.

CHAPTER II

LITERATURE REVIEW

To investigate the utility of BST to teach safety skills and ICT to teach behavior analytic procedures, I conducted a formal literature review on behavioral skills training and Interactive Computerized Training formats to teach instructors and caregivers how to implement safety procedures to children with autism spectrum disorder. The search engines I used, included PsychINFO, Academic Search Ultimate, ERIC, Education Full Text (H.W. Wilson), Education source, Psychology and Behavioral Sciences Collection, MEDLINE, Legal Collection, Communication & Mass Media Complete, and Military & Government Collection. The search terms combinations included: (a) computer training + autism, (b) interactive computerized training (c) computer assisted instruction + autism, (d) computer-based instruction + autism, (e) computer training + safe*, (f) computer training + emergenc*, (g) behavior* train* + safe*. This search produced 1679 possible articles. After removing the duplicates, nine articles met criteria for inclusion in this literature review. In order to capture any articles that were not located during the initial search, I conducted an ancestral search of all nine included articles. This provided one additional article for a total of ten included articles. Each of the included publications had to (a) be published in English in a peer-review journal, (b) included behavioral skills training or interactive computer-based training components (e.g., computerized modules, video examples, and interactive activities) as the primary independent variable, and (c) included an outcome measure in which the participant demonstrated a specific behavior analytic skill with a relevant subject or confederate playing the role of the relevant

subject.

Researchers have investigated the use of behavioral skills training and interactive computerized training to teach service providers and caregivers how to implement instructional procedures to individuals with autism. Given that the literature on ICT had demonstrated effectiveness at teaching academic tasks to service providers, the focus of the BST review was specifically regarding teaching safety skills to individuals who are service providers to individuals with special needs. Therefore, procedures to teach safety skills to children with ASD was not included. A description of each type of skill taught using BST or ICT is discussed in the sections that follow.

Behavioral Skills Training and Safety Skills Training

After a brief review of the behavioral skills training (BST) literature, there have been a few studies that aim to teach safety procedures to students and service providers. Reviewing these studies is informative to determine the efficacy of procedures to teach safety skills in a face-to-face format.

There has been a significant amount of research in which BST was used to efficiently teach fire safety (Jones, Kazdin, & Haney, 1981), abduction prevention (Johnson et al., 2005) and firearm safety (Gatheridge et al., 2004) to typically developing children and children diagnosed with a disability. However, Dickson and Vargo (2017), has been the only study that used BST to teach 32 typically developing kindergarten participants, how to respond during lockdown drills. A lockdown response is similar to the “Hide” response described by the U.S. Department of Homeland Security (2008). If

an intruder enters an educational setting, a formal lockdown drill requires the instructors and students to immediately seeking shelter in a protected area (Texas School Safety Center, 2013). In this study, the primary dependent variable was the percentage of lockdown drill steps completed correctly. If one student's performance did not meet criteria or engaged in an incorrect response, then it was scored for all students and they all experienced additional training. Results demonstrated that all groups met mastery within seven sessions with BST. These results maintained during the post-training phase.

Fewer studies have documented the effectiveness of using BST methods to teach educators and caregivers safety protocols, when working with students diagnosed with autism and other disabilities. In one example, Harriage et al. (2016) investigated the effects of BST in teaching participants to implement most-to-least prompting procedures to teach children to use pedestrian safety skills in community settings. Researchers used BST procedures to teach participants how to implement the pedestrian safety skills training to three individuals diagnosed with autism between the age of 14 to 23 years old. Correct use of prompting strategies was then measured as the primary dependent variable. Furthermore, the results of this study indicated that participants implemented the in situ, most-to-least prompting procedures with accuracy across different locations during intervention and after fading BST. These effects maintained for all participants after 1-month follow-up.

The previously described studies effectively used BST components to teach safety procedures to individuals diagnosed with autism and their instructors. However, although BST is an effective method, it may not be the most efficient format to teach educators

who work with children diagnosed with autism. One limitation of standard BST methodology, is the amount of resources it requires. For example, administrators and training professionals must be present at each training, in order to deliver the content. The cost for supplying qualified personnel to deliver these trainings with high quality fidelity may be expensive for organizations. Hence, in-person face-to-face training methods may not be a sustainable modality to disseminate safety training protocols, such as active shooter procedures, to educators and service providers, especially at remote locations.

Interactive Computerized Training

Interactive computerized training methods use a combination of asynchronous training components (e.g., interactive competency questions, activities, video models, self-paced information). Given these features, ICT methods are procedures that are completed without a professional and trainee to be simultaneously present for instruction to occur. This training method allows for more educators to access the training content, complete the training from any location, and complete the training at the learners preferred pace.

Interactive Computerized Training and Discrete Trial Instruction

Nosik and Williams (2011) determined the effects on the implementation of DTI components and backwards chaining procedures, across four therapists. Participants progressed through each of the three ICT content components until they reached the performance criterion (i.e., 100% accuracy). The progression of components consisted of:

(a) a competency based instruction with modeling, that incorporated instructions with video models of correct and incorrect implementation of DTI and embedded content questions; (b) written feedback, which required the participants to view four videos and score the instructors accuracy of implementation on a checklist; and (c) observed feedback, which included a video in which the participant observed the instructor in the video receiving corrective feedback.

Participants were then instructed to implement a least-to-most prompting procedure (i.e., independence opportunity, to a verbal, gestural, and physical prompt) with a confederate. The confederate either engaged in a correct response, incorrect response, or no response. These responses were written on three pieces of paper and selected, without replacement, to determine the confederate's response sequence. Following the ICT package, participants increased their accuracy in implementing both DTI and backwards chaining procedures with a confederate. Furthermore, the skills generalized to an adult with an intellectual disability. One participant met criterion following the first component and the other three participants required all three training components to meet criterion.

Nosik et al. (2013) extended the previous study to evaluate the effectiveness of traditional face-to-face BST to BST in a computerized format. The purpose of the comparison was to teach six behavior therapists to implement DTI procedures with a confederate. Both computerized BST and face-to-face BST formats contained the same components (i.e., instructions, modeling, and feedback). However, the computerized BST method did not include the rehearsal component. Participants were randomly assigned to

either traditional or computerized BST. Similar to Nosik and Williams (2011), confederates responded with the same scripts and procedures. Following the traditional BST, participants responding increased to 80% to 90% with a confederate. However, participants' in the computerized BST only slight improved their implementation of DTI to 50% to 75%.

Pollard et al. (2014) extended the literature in this area to investigate the effects of ICT to teach four college students to implement DTI with children with ASD. Participants were taught to use a least-to-most prompt and prompt fading procedure. Additionally, participants were taught more advanced teaching techniques (to differentially reinforce independent correct responding, delivery of an edible reinforcer paired with social reinforcement, and methods to intersperse the type of teaching targets across trials and instructional programs). The content was divided into four self-paced modules that included audio narration with supporting graphics and text, video models, interactive questions, self-guided practice opportunities, and pretest/posttest competency assessments. To proceed to the next module, participants were required to past the posttest with at least 80% of the questions correct. The ICT was accessed through an online course management site. After completion of each module, the participants implemented the procedures with a confederate. During this time, 20 DTI trials were interspersed across three instructional programs (e.g., imitation, receptive shape identification, and expressive color identification).

Prior to each research session, the sequence of five preplanned actions was randomly selected from a pool of 13 correct responses, five incorrect response, and two

no responses. The confederates engaged in several types of error, such as responding incorrectly to the instruction, not responding to the instruction, and not making eye contact with the instructor or materials. Additionally, each script had two opportunities for the confederate to respond incorrectly for two consecutive trials, in order to assess the participants' use of a more intrusive response prompt. Alternatively, the participants were not taught to fade prompts to a less intrusive response prompt.

At the completion of training, the participants reached mastery criterion (i.e., 85% or higher across two consecutive sessions) and demonstrated increases in fidelity of DTI implementation across all participants. Furthermore, all participants demonstrated generalization of DTI skills to a child with ASD, as well as to untrained instructional programs. One participant in this study required a brief feedback session in order to meet criterion during generalization with a student diagnosed with ASD. Feedback consisted of a description of incorrectly implemented components, as scored from a prior role-play session of the participant with a confederate. A second participant needed additional information regarding the topography of correct responding for a student.

Higbee et al. (2016), extended the effects of Pollard et al. (2014), by conducting an international study, in which researchers investigated the effects of ICT to teach DTI to four undergraduate students (Study 1) and four special education teachers in Brazil (Study 2). A Brazilian Portuguese translated version of the Pollard et al. (2014) ICT training was used to teach DTI implementation. Researchers recorded fidelity of implementation during role-play sessions with an undergraduate confederate (Study 1) and with a young child with ASD (both studies). Following the completion of the ICT

training, all participants increased the fidelity of implementation. Across both studies, more than half of participants required brief feedback on data collection or prompting errors to reach mastery criterion. After in person feedback was delivered, all participants' responding generalized to untrained instructional programs. During the maintenance sessions, fidelity of implementation met mastery criterion (i.e., 85% or higher) for three out of the four teachers.

Most recently, Geiger, LeBlanc, Hubik, Jenkins, and Carr (2018) compared the relative effects of computer-based instruction (CBI) programs to traditional BST methods, when teaching two groups of undergraduate students how to implement DTI. The participants were taught to use errorless teaching procedures to instruct audio-visual discriminations. The participants had no prior experience with DTI and were randomly assigned to one of the two conditions (CBI or traditional BST). The CBI training was similar to the training delivered in the Nosik and Williams (2011). At the end of each module within the CBI training, the participant completed a quiz that contained multiple choice, true/false, and scored video examples. The CBI training was complete after the participant met mastery criterion (90%) accuracy on the final cumulative quiz. Prior and after the CBI training, the participant implemented the procedures with a confederate research assistant, who engaged in the same number of correct and incorrect responding, but in an alternate sequence from the previous session. The results demonstrated that both training modalities increased the fidelity of DTI implementation. A brief feedback session resulted in the remaining participants meeting mastery criterion. The results indicated that although the BST method was more effective, the CBI training produced a

quicker acquisition of the skills demonstrated and a long-term rate of return on investment of time.

Interestingly, Geiger et al. (2018) noted that following the completion of this comparison study, a follow-up demonstration of the use of the CBI training was conducted with 10 different participants. These individuals were employed by a behavioral agency and implemented the procedures to teach children with autism. The CBI training was modified given the error analysis conducted on the responses from the participants in the study. After completion of the CBI training, the scores for post-training sessions increased to mastery criterion with a confederate, hence feedback sessions were not necessary. During the follow-up session, with a child diagnosed with autism, procedural integrity continued to meet mastery criterion.

Interactive Computerized Training and Teaching Communication

McCulloch and Noonan (2013) evaluated the effects of a package of online training videos (OTV) on the implementation of mand training by three paraprofessionals to three students diagnosed with autism in a public school setting. The primary dependent variable was the accuracy of the implementation of mand training and frequency of mands used by the participant. The procedural fidelity checklist included steps such as (1) sanitize the environment, (2) prompt the mand, and (3) reinforce. The OTV package included voiceover videos describing procedures, supporting texts and graphics, and competency checks following each video example. Additionally, after completion of the OTV, this package instructed the participants to download and print a self-evaluation

checklist. The participants were told to use the checklist to monitor their use of the mand training procedures during implementation of these procedures within the classroom setting. Participants were required to meet an 88% mastery criterion on the post-test, in order to complete the OTV package. All but one participant met criterion to complete the OTV; however, a subsequent increase in implementation accuracy was demonstrated when working with a child, for all participants. Furthermore, there was a corresponding increase in the frequency of student mands, as the participants increased implementation fidelity.

More recently, Rosales, Eckerman, and Martocchio (2018) evaluated the effects of a computer based customized training program to teach four undergraduate students how to implement Phase 3A of the Picture Exchange Communication System (PECS) with a confederate. Prior to conducting pre-training sessions, the participants were given a document that described all phases of PECS (via e-mail and hard copy), and were told that they were not required to read it. During all sessions, the confederate followed a behavioral script describing the type of response to emit. The computer-based training reviewed included two parts. The first described how to respond when a learner exchanged the icon of the preferred item and the second reviewed how to respond when the icon was exchanged for a nonpreferred item. The training included audio descriptions, video examples of correct and incorrect implementation of each component within the procedure, and interactive activities. Procedural integrity data were collected prior and after the completion of the computer-based training, with a confederate research assistant. Results of this study demonstrated improved performance from baseline to post training

sessions. All participants reached mastery criteria after completion of the computer-based training. Performance remained at mastery after 2-4 week maintenance sessions.

Interactive Computerized Training and Teaching Play

Wainer and Ingersoll (2013) investigated the effects of an internet-based self-directed distance learning program on the implementation of a naturalistic behavioral intervention, reciprocal imitation training (RIT). The participants in this study included six therapists (Sample 1) and three mothers (Sample 2). The therapist implemented the intervention with five children diagnosed with ASD and the mothers implemented the procedures with their child with autism. The primary dependent variable was the implementation of intervention techniques and child rates of imitation. The imitation tasks were play actions with tangible toy objects. An electronic copy of a training manual that contained descriptions of RIT techniques was provided to the participants. Pretraining and post-training sessions consisted of 10 min sessions in which the participant was told to play with the child as they typically would. During post-training sessions, if the participant did not reach mastery criteria by the last session, then a 30 min in person demonstration was provided by a coach. The online training program consisted of an instructional module which included audio procedural descriptions, short comprehension quizzes, and short interactive learning tasks. The results of this study indicated that all therapists improved their implementation of RIT techniques at post-training, relative to baseline. Two therapists required the 30 min coaching session before they met mastery criterion. Similarly, all three mother participants increased

implementation of RIT after completing the internet-based training program, however, only one mother required the coaching session before meeting mastery. Furthermore, child imitation of play actions increased simultaneously, with participant fidelity of implementation.

More recently, Gerencser, Higbee, Akers, and Contreras (2017) examined the use of ICT on fidelity of activity schedule implementation by parents. The three participants practiced with a confederate who played the role of the participant's child with autism, during baseline and initial post module sessions. Confederates were included in order to avoid exposing the children to incorrect activity schedule implementation, given that the researchers also measured child performance. The ICT included voiceover narration, video examples, and short activities explaining how to implement an activity schedule with the participant's child. Following ICT, the parents continued to implement an activity schedule with an adult confederate playing the role of their child with ASD. All parents performed to criterion when working with the confederate, after which, they then implemented the activity schedule procedure with their child. All participants performed to criterion, including the child's independent activity schedules performances.

In conclusion, ICT seems to be an effective alternative training method to increase participants' implementation of a variety of instructional skills needed to work with children diagnosed with autism. ICT formats have been designed to include similar components of BST, but without needing the presence of a professional. Participants can receive descriptive audio and text instructions, as well as graphic images and videos. Participants can view the skills modeled through video demonstrations and receive

frequent feedback through embedded content question and pre- and post-module content tests. In addition, participants can practice the skill through self-guided role-play sessions. In addition, participants can practice the critical thinking and skill development through self-guided role-play sessions.

Summary and Limitations of Asynchronous Training Methods

The current literature demonstrates the potential utility of ICT methods as an alternative solution to the barriers associated with more traditional training methods (i.e., those mediated by a professional). ICT methods can increase the accessibility to safety interventions and has the potential to train large quantities of service providers. However, there are several limitations with the existing literature to consider.

First, the majority of the literature has focused on teaching academic teaching procedures to educators and service providers. In fact, no studies were located that utilized interactive computerized training to teach teachers or instructors any type of active shooter response. ICT may be the most efficient option for training more complex behaviors, such as dynamic safety skills decision making. ICT can incorporate components of self-instruction manuals and video modeling into one comprehensive training package. With narration, text, graphics, video models, interactive activities and competency checks, ICT has similar components of BST provided in an asynchronous format.

Last, although all participant performance increased across all studies after the ICT, in previous studies some participants required additional in person feedback, in

order to reach the performance criterion. Providing face-to-face feedback limits one of the main purposes of ICT – eliminating the need for a professional to be physically present. A combination of ICT and telehealth have been used to investigate the effectiveness to teach service providers to implement instructional procedures (Fisher et al., 2014). Service providers viewed the training online and then practiced implementing the skills, while receiving feedback and coaching via telehealth from a professional. Therefore, if service providers require additional feedback to increase procedural fidelity, it is possible that performance feedback could be delivered remotely using video conferencing or telehealth.

In conclusion, BST has been effective at teaching safety skills procedures. However, this training method may not be accessible in remote areas and it may be too costly for all organizations to obtain. ICT has been shown to be an effective method to teach a variety of skills to instructors who deliver services to individuals diagnosed with autism. Although a majority of the literature focuses on ICT methods to teach academic skills, this method may also have the capacity to teach safety responses. Furthermore, previous research has demonstrated that additional in person feedback was sometimes needed to assist participants in reaching mastery criterion. Therefore, it is important to determine the effectiveness of remote video conferencing platforms, if in person feedback is needed.

Purpose and Research Questions

Researchers have not yet investigated if ICT can be effectively used to teach

educational staff to respond to active shooter situations. Therefore, the purpose of this study was to extend the existing literature on ICT by investigating its effects on teaching educational staff who work with children diagnosed with ASD to respond to two active shooter situations. The specific research questions were as follows.

1. To what extent will an interactive computerized training increase educators' accurate responding to two active shooter situation signals with a simulated student, as measured by percentage of correctly completed components on a fidelity checklist?

2. To what extent will educators' correct responding to the two active shooter responses generalize to these situations with an actual student diagnosed with ASD?

3. To what extent will educators' correct responding in the two active shooter situations maintain across a 2 week period, as measured by percentage of correctly completed components on a fidelity checklist?

4. How efficient will the ICT method be to teach educators to respond to active shooter situations, as measured by the duration of time to complete the modules?

5. How favorably will participants find the ICT program to be at teaching them to respond to active shooter situations, as measured by a social validity questionnaire?

6. How favorably will parents of student participants respond to the study procedures?

CHAPTER III

METHOD

Participants

Given that the purpose of this study was to train educators who work with children with autism, we recruited two types of participants. The primary participants for this study were undergraduate instructors at least 18 years old who volunteered at an on-campus preschool, between 1 and 30 hours a week (see Table 1). These participants had volunteered at the preschool between 1 month and 1 year. The 2-week limit ensured that the instructors participated in an initial applied behavior analytic training, which included student specific behavior management, such as descriptive protocols to decrease the occurrence of the student's challenging behaviors (e.g., withhold attention when the student is engaging in aggression to access attention). The 1-year maximum criterion prevented inclusion of long-term instructors, who had previously completed a training on

Table 1

Student Participant Demographics

Student participant Instructor participant	Harvey (Sophia)	Jade (Riley)	Cole (Carl)
Age	4.5 years	3.3 years	3.4 years
Ethnicity	Caucasian	Caucasian	Caucasian-Pilipino
Number of months receiving instruction at the university preschool	15	8	8
Verbal behavior skills	5-word statements	3-word statements	Level 2 -PECS
Verbal Behavior Milestones and Placement Program (VBMAPP)	104	130	110

active shooter responding. All instructors who volunteered at the university preschool, attended a brief instructional training on emergency protocol and an in-person training to prepare for active shooters. Participants in this study, were those who attended the brief instructional training on emergency protocols, but had not yet participated in didactic in-person active shooter training. Additionally, a qualitative survey of the participant's experiences and knowledge related to active shooter drills was obtained to determine if they qualified for inclusion of this study (see Appendix A). Last, all participants had obtained training broadly addressing challenging behaviors, and other advanced content relevant to working in an intensive ABA-based preschool (e.g., building compliance, activity schedules, naturalistic teaching, etc.). The participants demonstrated his or her healthy physical condition by lifting a 40-pound simulated student for a distance of 30 feet without placing it on the ground. A research assistant measured this behavior with a standard measuring tape, one time before the start of the study.

Secondary participants included preschool students diagnosed with ASD (see Table 2). The students were between 3 and 5 years old and attended an on-campus university preschool. All students who participated in the study weighed no more than 40 lbs. For the purpose of transportation within this study, student participants did not engage in aggressive or self-injurious behaviors. Aggressive or self-injurious behaviors were defined within their behavior plan by their case managers. Students who demonstrate the following skills were eligible to participate: (1) waited without challenging behavior for 1 min with no more than 1 physical prompt, and (2) followed one-step receptive action directions. Gross motor skills, including running and crawling,

Table 2

Educator Participant Demographics

Instructor participant	Sophia	Riley	Carl
Age	19 years	20 years	23 years
Ethnicity	Caucasian	Caucasian	Caucasian
Number of weeks volunteering at the university preschool	2	2	14
Number of days working with student participant prior to the start of the study	2	5	12
Year in school	Junior	Sophomore	Senior
Major	Psychology	Special Education	Speech and Language Pathology

were not a requirement of participation in this study, given that the student participants were carried by the instructor participants. Verbal Behavior Milestones and Placement Program (VBMAPP; Sundberg, 2008) scores were 104, 130, and 110, for Jane, Harvey, and Cole, respectively.

Settings

Given the nature of the research questions, this study took place across different locations on a state university campus. Sessions began inside the classroom within the instructional area. Sessions ended in the classroom or outside on the sidewalk approximately 15 m from the building the locations listed below. Prior to the start of the study, research assistants coordinated with the local police force and nearby organizations in the building to schedule research sessions and locations (Federal Commission on School Safety, 2018). These actions avoided causing alarm to the university attendees during research sessions.

Classroom (Teaching)

Researchers conducted teaching sessions within the university-based preschool classroom for children with ASD. The room contained 10 individualized instructional teaching areas/cubicles (1.5 m by 2 m) and an open play area containing thematic play equipment (e.g., wooden kitchen set, dress up station, small table with 2 chairs, and bookshelf).

Storage

Within the storage area was also located a small (4.5 m by 2.5 m) closet containing teaching materials and leisure toys organized on metal shelves. This room contained no windows and only one door to enter and exit. Also included in this closet were medal filing cabinet (0.75 m x 0.30 m x 1.2 m).

Office

Within the office (3 m by 2.5 m) was located a small table and two chairs. This room contained no windows and only one door.

Sidewalk Route

The outdoor sidewalk surrounding the university preschool in the direction of the university gym was used to transition from one location to the next. The smallest width of the sidewalk was 3 m, and the entire length of the route was approximately 221 m. The participants did not have the opportunity to run the entire distance, as the researcher stopped them approximately 15 m from the university building. The sidewalk was located between the university preschool, educational research building, parking lot, and athletic

field. This route was exposed to the elements and was not located under any awning or overhead covering

Materials

The Department of Homeland Security published a 13-page guideline booklet and pocket card guide (5 cm by 8 cm) in 2017, which described how to respond in an active shooter event. Researchers printed a copy of the government provided documents and provided blank lined paper for the participant to record personalized notes. In addition, researchers also included, a specialized decision flow chart that described all safety procedures presented in the modularized training tailored for the university preschool. Hence, the participant received information to demonstrate correct responding in both active shooter situations (see Appendix B). In order to communicate the location of the active shooter to the instructor participant, without alerting others in the room, a researcher visually displayed an 8" x 11" laminated sheet of paper, with the following information: "ALERT: Active shooter on campus. You _____ see or hear the active shooter," in Times New Roman font size 72 (see Appendix C). The blank section of the alert was completed with either the word, "can" or "can't," In order to conduct multiple sessions without alerting the students, or removing valuable instruction time, we used a simulated student during all baseline and post-training sessions. The simulated student was a 3-foot child doll weighing approximately 30 pounds (see Appendix D). An emergency supply backpack containing a role of DuckTape®, diapers, non-scented wipes, water, snacks, and an iPhone located in the student's instructional area. Across

each setting, a researcher placed a doorstop, with Velcro on the back of each door. Researchers used a timer to record the length of time required for the participant to reach the final location and the length of time needed to complete the online module. A video camera was used to record all experimental sessions for data collection purposes.

An online ICT module was delivered to the participant on a desktop computer that had internet access, located in the office area of the preschool classroom. The ICT module was developed using Adobe Captivate® version 9 software and was accessible on an online course management system, Instructure Canvas. The training modules included audio narration, supported text and graphics, video models, competency questions, and timed interactive activities.

The content of the modules was developed using resources provided online (i.e., from the department of homeland security and the department of education) and pre-existing didactic training PowerPoints™, designed to teach the university preschool educators how to respond in the case of an active shooter. Researchers consulted with the preschool administration and university emergency management coordinator to customize the protocol specifically for the personnel at the university preschool. The content and video examples were restricted to the "Run" and "Hide" emergency responses, recommended by the department of homeland security. The "Fight" response was not included in this online training both because of the difficulty of simulating and measuring the quality of this response, as well as to prevent placing the instructor participant and student participant from increased risk of injury. Additionally, in a report conducted by the U.S. Department of Justice (2013), more than half of the incidents

ended on the shooter's initiative (e.g., committing suicide), while less than 25% of incidents ended after unarmed citizens successfully restrained the shooter. If the participants are successful at engaging in the "Run" or "Hide" situations, the risk of engaging in a "Fight" situation may be reduced in an actual emergency.

Timed competency questions and interactive activities were imbedded throughout each module to emphasize specific content. If the instructor participant answered a question or completed an interactive activity incorrectly, they were redirected to the relevant content to review again and then given the opportunity to answer the question correctly in the module. The participant would then continue through the module until the question was answered correctly. Interactive questions included multiple-choice, true or false, or matching activities.

Response Measurement and Reliability

Trained research assistants collected data using the videos recorded during all research sessions. To limit intrusiveness, we recorded from a distance of 5 feet and recorded from cameras located within the ceiling across the classroom. Given how important it was to respond correctly to the location of an active shooter, determining which response the participant engaged in (run or hide), was paramount.

Researchers recorded if the instructor participant chose to run or hide, when they were provided the active shooter alert. If the active shooter could be seen or heard by the participant, the participant should have engaged in a hide response. If the active shooter could not be seen or heard by the participant, the participant should have engaged in the

run response. Related to the response that the participant selected, was the duration of time required to reach the terminal location. The researcher started the timer once they presented the alert signal to the participant. The researcher stopped the timer after the participant completed all steps on the checklist, 1 min elapsed in which the participant did not engage in any of the required responses, if the participant indicated that he or she was done or needed to end the session, or 10 min, whichever occurs first. If the participant exited the classroom building, a researcher would stop them approximately 15 m from the building and ask what they would do next. Researchers scored their verbal report of their next actions.

The primary dependent variable was a checklist of procedural steps necessary to increase probability of survival in these emergency situations (see Tables 3 and 4). Specific responses on the checklist were weighted more heavily in regards to the point system, relative to others. For example, if the instructor participant selected to hide in the office, rather than the storage room, the response were scored at 3 points instead of 5 points (if they had hid in the storage room). In addition, there were responses across both the Run and Hide situations that terminated data collection (see items with a superscript "a" in Tables 3 and 4). An example of this would a situation in which the instructor participant forgot to take the child when he or she exited the instructional area. If the instructor participant did all of the steps correctly in either chain, but did not take the child with them, then the chain of responses was overall ineffective. If the participant engaged in each of the responses within the response chain, they would receive full points. The percent of correctly followed steps over the total steps during each session

Table 3

Checklist of Procedural Steps During A "Run" Active Shooter Situation

Category	Run - Action/Items	+/-	Point	Total
Proactive	Identification badge visible		1	
Items taken	Within 5 seconds of the notification, stop current action place instructional items on the table or floor		3	
	Child remains within arms distance of the participant until end of session (offset of 3 sec) [a]		5	
	Place emergency backpack on both shoulders before leaving the cubby and remains on participant until within a safety location		5	
	Avoids picking up any other items (except emergency backpack and child) before leaving the cubby. Leaves all items not on their person at the time of the alert.		1	
Comm	Tell student, "It's time to go" before moving the student		1	
	Remain silent, unless communicating to the student instructions in a whisper. [a]		5	
	Redirect student to stay quiet or use a whisper voice each time the student makes a noise. Indicate N/A if the student doesn't make any vocalizations.		5	
Transport method	Run the entire distance to safe location (offset of 3 sec) [a]		5	
	Carry student		3	
	Hold the child's hand		1	
	All other methods		0	
Transport duration	Locate a concealed area outside of the classroom building within 3 min of the alert [a]		5	
Route to terminal location	Red route		3	
	Orange route		1	
	Other routes		0	
Terminal location	Gym		5	
	City park		3	
	Athletics field		1	
	Any other locations		0	
Action in location	Position child in a concealed area outside of the classroom building		1	
	Call emergency personnel		1	
% correct responding = Response points / Total Points =				
Total Duration				

Table 4

Checklist of Procedural Steps During A "Hide" Active Shooter Situation

	Hide - Action/Items	+/-	Point	Total
Proactive	Identification badge visible		1	
Items taken	Within 5 seconds of the notification, stop current action place instructional items on the table or floor		3	
	Child remains within arms distance of the participant until end of session (offset of 3 sec) [a]		5	
	Place emergency backpack on both shoulders before leaving cubby and remains on participant until within a safety location		5	
	Avoids picking up any other items (except emergency backpack and child) before leaving the cubby. Leaves all items not on their person at the time of the alert.		1	
Comm	Tell student, "It's time to go" before moving the student		1	
	Remain silent, unless communicating to the student instructions in a whisper. [a]		5	
	Redirect student to stay quiet or use a whisper voice each time the student makes a noise. Indicate N/A if the student doesn't make any vocalizations.		5	
Transport method	Run the entire distance to safe location (offset of 3 seconds) [a]		5	
	Carry student		3	
	Hold the child's hand		1	
	All other methods		0	
Transport duration	Locate a concealed area outside of student's instructional area within 30s of the alert [a]		5	
	Complete all steps of the barricade procedures in the safe location within 2.5 min of the alert		3	
Terminal location	Storage room		5	
	Office		3	
	Any research rooms		1	
	Any other locations		0	
Barricade	Lock door by removing magnet or with keys [a]		5	
	Position child in concealed area [a]		1	
	Give child tangible (from shelf or backpack)		1	
	Use doorstop		1	
	Use tape		5	
	Place furniture by the door (covering the length of the door's width) [a]		3	
	Position self between child and doors/windows		5	
	Child remains in same location through the end of the research session or the instructor attempts to keep the child in the same location		1	
	Call emergency personnel		1	
% Correct Responding = Response points / Total Points =				

was calculated by the researcher for each participant. A secondary dependent variable was the duration of time that the instructor participant needed to locate the terminal location and completed all steps on the checklist, as well as the duration of time to complete the interactive computerized training. Although these data were collected across all conditions of the study, only data for sessions that the participant completed the chain of behaviors (i.e., post-treatment sessions) were reported in the results section below.

A social validity measure was collected by the researchers to qualitatively demonstrate the acceptability and effects of the module training on the safety of students and educators (see Appendix G). We obtained a measure of social validity after the completion of the training module. The instructor participants were asked to complete a questionnaire to obtain information about their training experiences.

Finally, research assistants administered a questionnaire (see Appendix H) at the completion of each participant's involvement in this study, to quantify any demonstration of fear responses exhibited by the student participant as a result of their participation in this study (Johnson et al., 2005). The questionnaire included questions about the student participant's behavior while attending school, if the guardian approved of the study procedures and communication from researchers. Researchers delivered the questionnaires to the guardians, when they picked up their student from school, within 3 days after the student participant completed the session.

Interobserver Agreement and Treatment Fidelity

Independent observers collected data for at least 33% of research sessions across

all phases and for all target behaviors. Research assistants collected data using recorded videos to assess interobserver agreement (IOA). We calculated point-by-point IOA for the primary dependent variable, in which an agreement was scored if both independent observers recorded the same score for each component on the checklist (see Table 5). IOA was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplied by 100, to yield a percentage. In addition, research assistants also collected mean duration per occurrence IOA for the duration of time until the research session ended. Mean duration per occurrence IOA was also collected for the duration of time that the instructor participant needed to complete the interactive computerized training. Mean duration per occurrence was calculated by dividing the smaller observer's duration over the larger observer's duration and multiplying the product by 100. The research assistants meet to discuss independent observer scores, and continued to re-train, until reliability was above 90%.

Table 5

Interobserver Agreement, Treatment Integrity, and Procedural Integrity Summary

Participant	% Collected	Mean IOA %	IOA Range %	Mean PI %	PI Range %	Mean TI %
Sophia	46.1	96.9	93 – 100	100	100	100
Riley	48.3	99.1	96 – 100	95.8	75 – 100	100
Carl	40	99.3	96 – 100	97.9	75 – 100	100

Independent observers also collected data on procedural fidelity for at least 40% of sessions across all phases for research assistants who conduct the research sessions. Treatment fidelity data were collected on conducting probe trials using a checklist to

determine the extent to which: (a) the alert signal was provided, (b) the correct information on the signal was presented, (c) the researcher who was video recording remains unobtrusive to the participant's actions by staying at least 10 feet away from the participant and not engaging in any vocal statements, and (d) the simulated child and backpack, with all required materials, were located in the participants instructional area prior to the start of the session, (e) all research locations were available, supplied with the research materials, and not occupied by other students or educators.

Treatment fidelity data was also collected on providing the online modules using a checklist to determine the extent to which: (a) the module was started on the computer, and (b) the materials folder with the hard copy files of the training were placed on the table.

Experimental Design

We use a nonconcurrent multiple-baseline design across participants to evaluate the effects of the ICT to teach educators, who work with individuals diagnosed with autism, to engage in the correct components of the emergency response, during an active shooter emergency. We conducted the multiple-baseline design nonconcurrently given the limited number of days remining in all participants' semester. Furthermore, we arranged sessions so that participants never overlapped in order to limit exposure to treatment procedures. A minimum of five baseline sessions, across each "Run" and "Hide" probes, were conducted by the researchers for the first leg of the multiple-baseline design. Research assistants conducted semi-randomized "Run" and "Hide" probes, in

order to avoid the participants predicting future types of sessions. Following legs of the design had a lag of at least two additional sessions, during baseline. The five baseline sessions were followed by two generalization sessions in which the instructor participant interacted with the student participant, rather than the simulated student. Phase changes were dependent on the stability of the data path that demonstrated the percent correctly implemented components. Demonstration of the effects of the ICT in the first leg of the design were required before the participants in the subsequent legs of the design completed the ICT.

Research assistants conducted up to four research sessions across each work shift per day, between two and four days per week. If more than one session was conducted, then they were separated by a minimum duration of 10 min.

Procedures

General Procedures

The first author instructed all research assistants to implement research sessions using Behavioral Skills Training (BST; Parsons & Reid, 1995). BST includes a combination of describing the procedures, modeling each step of the procedures, observing the research assistants practice each step of the procedures using a checklist, and providing detailed feedback for all steps of the procedure. The research assistants created a context similar to an actual unexpected active shooter situation, by conducting sessions during periods when the instructor participants were scheduled to work in the university preschool. The educators were not provided any information about scheduling

the active shooter situation, until the research sessions begin. Although research sessions for all participants were conducted on the same day, only one educator participant was scheduled at a time to limit their exposure to research protocol or training. In each individualized instructional cubicle, a researcher placed the emergency backpack with supplies and the simulated student. Additionally, research assistants were located around the classroom in order to prevent any unnecessary instruction interruptions from other students and educators. Researchers delayed access to relevant locations (i.e., those listed in the settings section).

During each session, the researcher signaled to the participant that an active shooter emergency was taking place and whether or not the reported shooter was close enough to be heard or seen. The researcher delivered the notification of an active shooter drill by holding up the signal within 3 feet of the instructor participant. Sessions ended once the instructor participant completed all steps on the checklist, 1 min elapsed in which the participant did not engage in any of the required responses, if the participant indicated that he or she needed to end the session, or 10 min, whichever occurred first. If the participant exited the classroom building, they were stopped on the sidewalk approximately 15 m from the building by a researcher who was waiting out of sight to ask the participant, “please tell me in as much detail as possible, what steps you would do next in this emergency situation. Then tell me when you are done describing,”

It was important that the research assistant was present at the university preschool during times when research sessions did not take place. This reduced the probability that the presence of this educator served as a signal for the instructor participant, that an

active shooter situation was scheduled. Additionally, a second educator was present in order to continue instruction with the actual student while the instructor participant completed the active shooter responses with the simulated student.

Pre-Baseline Training

Before baseline sessions began, the researcher provided the instructor participant with a copy of the U.S. homeland security provided documents and organization decision flow chart (see Appendix B) and told the participant that they had up to 90 min to read through the documents. The organization decision flow chart included information regarding when to Run or Hide and was a specific checklist of correct behaviors for both responses. This diagram was also included in the interactive computerized training module. The instructor participant was told the following by the research assistant, *"please review the materials provided to you. You will have up to 90 min to read the documents. If you are done sooner, please let me know. During this time and through future research sessions, I will not answer any questions or provide you with any assistance."* During this time, participant read the materials. The research assistant then begin the timer and remain silent. If the participant asked any questions or converses with the research assistant, then the research assistant responded, *"I am sorry, but I cannot answer any questions at this time. Try your best and let me know when you are finished,"* Once the participant indicated completion, the research assistant said, *"You are all done,"* The materials were then collected by the researcher and not provided to the participant again.

The instructor participant was told the rules of the research sessions each day by

the research assistant. Specifically, they were told,

> Research sessions will take place during your scheduled shift. To reduce loss of instructional time for your student, a simulated student will be provided for you in your individualized instructional cubicle. When the research session begins, interact with that student as you would your typical student in an emergency situation. A research assistant who is trained to instruct the student, will work with your student while you are in the research sessions. The research session will end after 10 min, or when the researcher says "stop, you are done with the research session," To end each research session before that, tell the researcher "I am done, I would like to end this session."

Finally, to reduce generalization of skills across participants, we told the participant,

> To determine the effects of the training materials, it is important that you do not share any part of your experience in these research sessions with any other educational staff, until the study is completed for all participants.

Baseline

During baseline, participants were in the individualized instruction cubicles, as typical during the school day. If the participant was taking a restroom break or play break with the student participant, then the start of the session was delayed until they returned to the instructional cubby. This was so that the simulated student and emergency supply backpack was in close proximity. Participants were instructed to engaged in the active shooter response with the simulated student, using the alert signal. The alert signal only provided information about whether or not the active shooter was close enough to be seen or heard. This information indicated an approximate distance to the active shooter (see Appendix C). The type of session that were conducted (given the information on the signal), was scheduled semi-randomly. This was to prevent the participant from predicting the type of session that would be conducted next. No feedback or assistance

were provided by the research assistant. We continued to run baseline sessions until the participants' responding had stabilized (i.e., three sessions without an upward trend) for both types of probes.

Student Participant Generalization Probe

Following baseline, one of each Run and Hide generalization probes were conducted. The generalization probe demonstrated how the participant responded differently with an actual student across both a "Run" and "Hide" situations. Immediately after the previous baseline probe ended, the researcher removed the simulated student from the individualized instruction cubicle and told the participant, *"Across the next couple of sessions, you will be expected to respond to the alert signal with your student."* The researcher then removed the simulated student from the instructional area. Similar to baseline sessions, this generalization probe began when the student and participants were located in the individualized instructional cubicle. The researcher provided the alert signal and refrained from communicating further with the participant. No feedback or assistance were provided by the research assistant.

Interactive Computerized Training

After the researchers had conducted the generalization probes, the participants were instructed to complete the interactive training module. Participants were brought to the classroom desktop computer, at least 10 feet away from other students, educators, and research assistants. The module was the only activity present on the computer. The researcher provided headphones to the instructor participant to complete the training

without distractions from the classroom. The participant was told to find the researcher when they completed the module content. Technological difficulties did not occur and were not reported by the participant.

Post-Training

Following the ICT, participants were instructed to respond to the following active shooter situations with the simulated student, identical to baseline sessions. Immediately after completion of the ICT, the research assistant told the participant, *"across the next research sessions, you will be expected to respond to the alert signal with the simulated student participant"* and place the simulated student back in the individualized instructional cubicle. Research assistants continued to conduct post-training sessions until the participant performed to criterion (i.e., 90% or higher across the "Run" or "Hide" fidelity checklist) across five consecutive sessions.

Post-Training Generalization

The same two types of generalization probes conducted prior to the ICT, were conducted following the previous post-training sessions. The generalization probe demonstrated how the participant responded differently with an actual student. Immediately after the last post-training research session, the research assistant told the participant, *"across the next couple of sessions, you will be expected to respond to the alert signal with the student participant,"* The research assistant then removed the simulated student from the instructional cubicle. No feedback was provided regarding the participant's performance.

Maintenance

Follow-up probes were conducted at least 2- weeks after the final session in order to assess maintenance of the correct responding across each active shooter situation. One of each probe (i.e., "Run" and "Hide") were semi-randomized across the three participants. Immediately following the generalization probes, the research assistant told the participant, *"across the next research sessions, you will be expected to respond to the alert signal with the simulated student participant"* and placed the simulated student back in the individualized instructional cubicle. Maintenance sessions were conducted by the researcher similar to the post-training sessions. No feedback was provided to the participants during or after the research sessions.

CHAPTER IV

RESULTS

Figure 1 represents the data set across the three target participants. The data path containing circle and square symbols, depict the "Run" and "Hide" response, respectively. The Y-axis depicts the percentage of correctly implemented components of the total responses as measured by the fidelity checklist. Figure 4 represents duration to complete both the Run and Hide responses, across the three participants. The data on the Y-axis depicts the duration in seconds of the time from the instruction delivered by the research assistant, to the time the end of the session.

Sophia

Sophia's results are pictured in the first panel of Figure 1. Sophia always engaged in the Hide response during every baseline session, regardless of the changing information provided to her on the alert sign. Each instance in which the information provided to her on the alert sign indicated a Run response, Sophia engaged in actions to Hide within the classroom. Across each of the Run sessions during baseline, she correctly engaged in 20% of steps on the checklist. Across the Hide sessions during baseline, she correctly engaged in between 8 to 14% of steps on the checklist. These data remained stable at a low level across all baseline sessions. Her hiding behaviors in this context were similar across sessions.

For Sophia, after receiving the alert, she carried the simulated student to a concealed area of the classroom, either inside the individualized instructional area, or

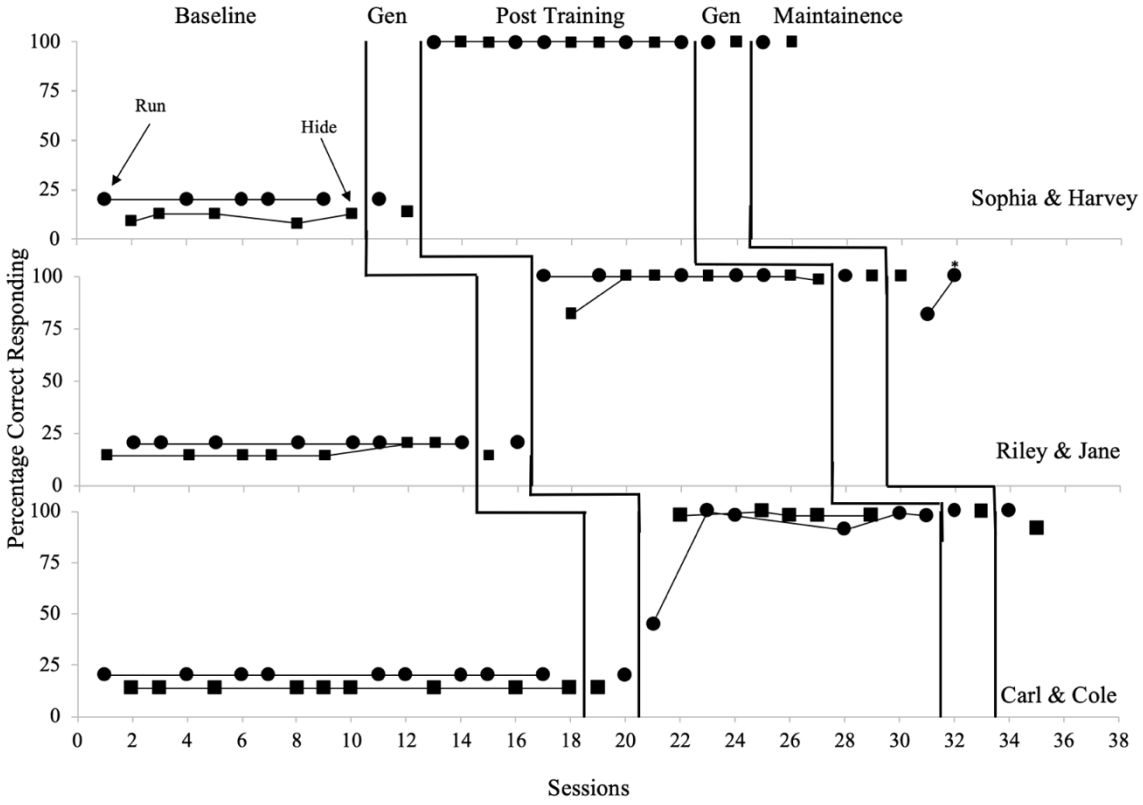

Figure 1. Percentage of correctly implemented components of responding during an active shooter situation, across three participants.

within another room of the classroom (e.g., office). After selecting a location, she consistently barricaded that area by placing at least one piece of furniture by the exit of the location (e.g., office chair, instructional table, or toys). During some of the baseline sessions, Sophia stated instructions to the simulated student (e.g., “shh” “here we go” “come here”). Sophia performed similarly during the Run and Hide generalization sessions, in which a student participant was present. She selected to hide in the same locations (i.e., individualized instructional area), placed at least one piece of furniture by the exit of the space, and instructed them by saying “shhh,”

Figures 2 and 3 depict an error analysis for the Run and Hide responses for all

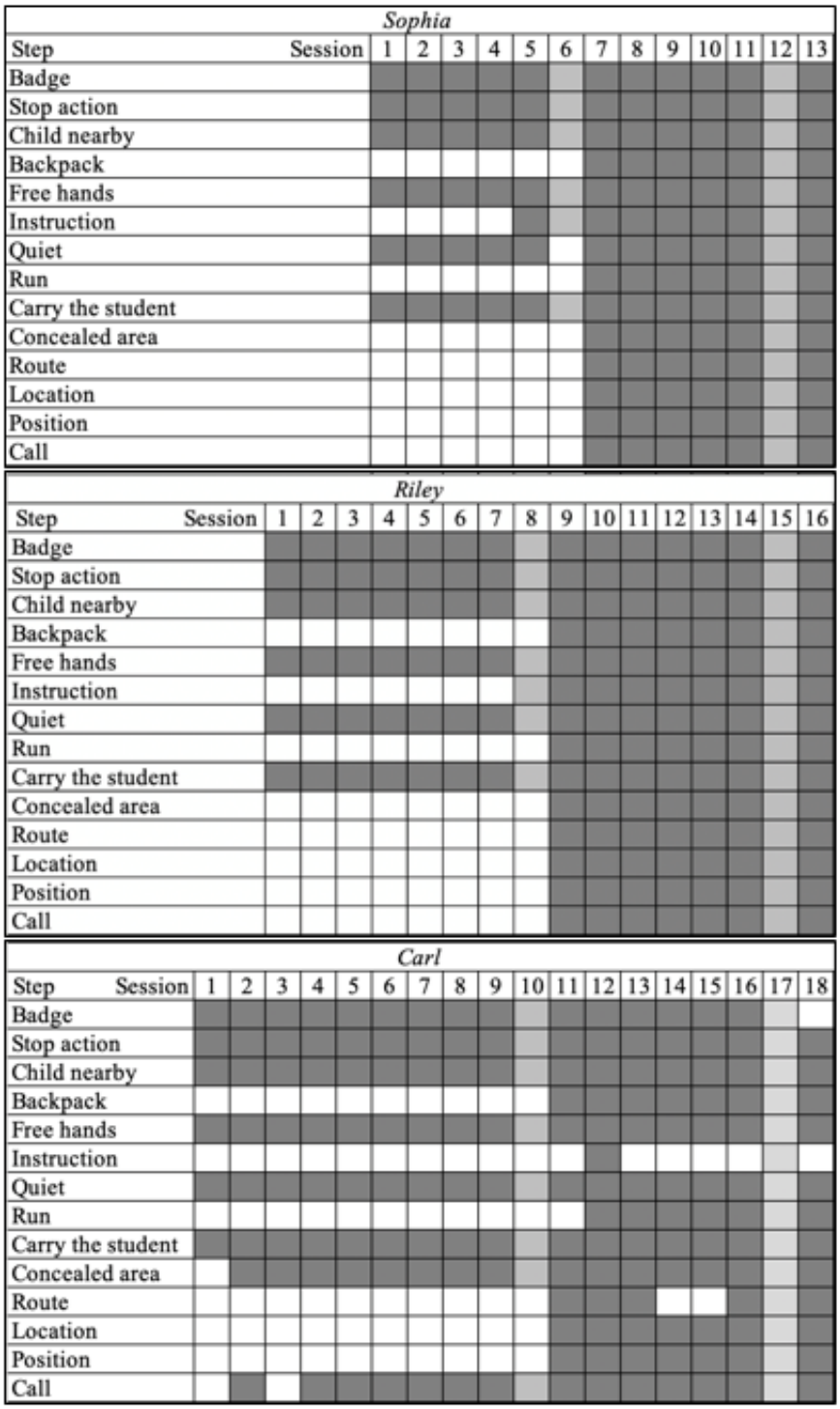

Figure 2. Error analysis of correctly implemented components within the Run response during an active shooter situation, across three participants. Dark gray squares indicate correctly implemented components during baseline and post-training sessions. Light gray squares indicate correctly implemented components during generalization probes. White squares indicate incorrect implementation of the component.

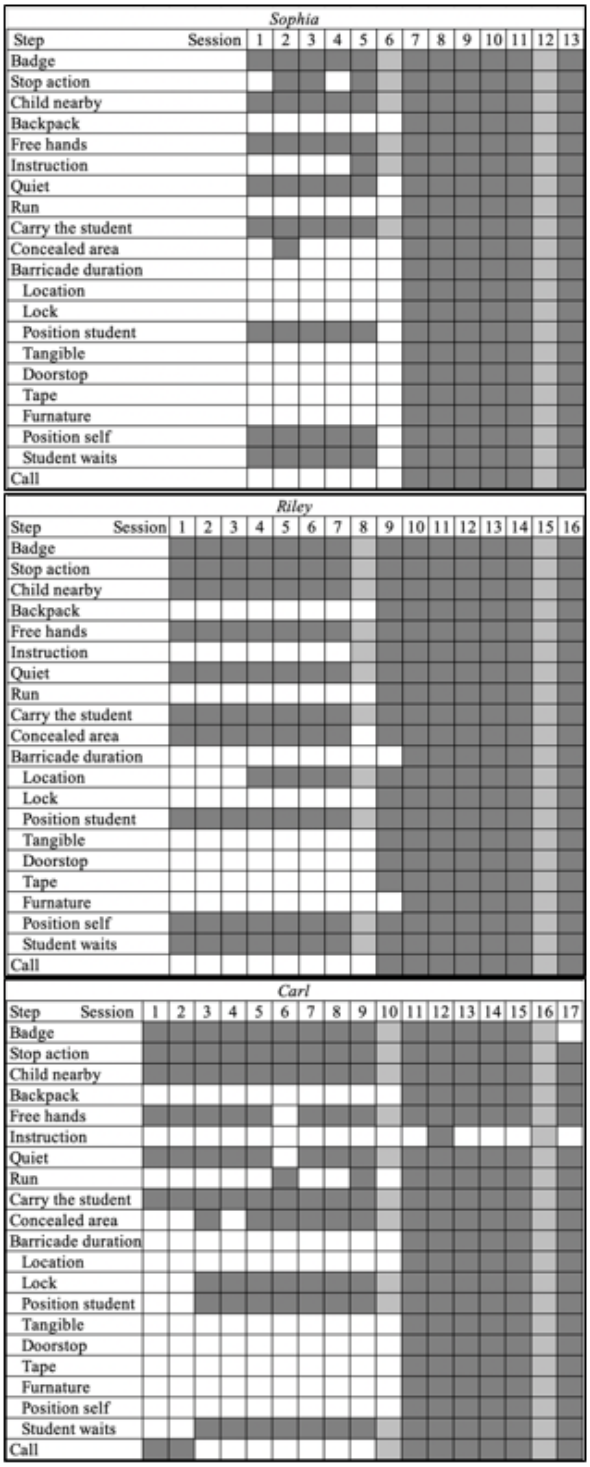

Figure 3. Error analysis of correctly implemented components within the Hide response during an active shooter situation, across three participants. Dark gray and light gray squares indicate correctly implemented components during baseline/post-training sessions and generalization probes, respectively. White squares indicate incorrect implementation of the component.

participants. Across all participants three common errors occurred for both the Run and Hide responses. Specifically, carrying the emergency backpack, delivering an instruction to the student participant, and running the entire distance to the safe location did not occur. In addition, Sophia did not locate a concealed area outside of the school building, which prevented her from using a safe route. During the Hide response, Sophia made the common errors which was the absence of critical barricading components (e.g., securing the doorstop, locking the door, or delivering a tangible).

After Sophia completed the interactive computerized training, she immediately began selecting the correct Run or Hide response contingent on the information provided on the alert signal across all sessions. Furthermore, across the two types of responses, she completed all actions correctly (i.e., 100% correct responding). Sophia met termination criteria after five sessions of each response. Furthermore, Table 6 and 7 represent the duration of Sophia's Run and Hide responses (also see Figure 4). Only the data for sessions in which all steps were completed are described in Table 6 and 7. This is because all participants indicated that they were "done" before the completion of the chain of behaviors. Therefore, baseline sessions would artificially reflect shorter durations than post-treatment sessions. On average, Sophia completed the Run response in 98 s (range 78 – 152 s) and the Hide response in 90 s (range 72 – 109 s). We then conducted a Run and Hide generalization probe with the student participant present, rather than the simulated student. During these probes, Sophia continued to engage in 100% correct responding across both the Run and Hide sessions. After 2 weeks, Sophia engaged in 100% correct responding across both Run and Hide responses.

Table 6

Run Response Duration

Participant	Mean duration	Min duration	Max duration
Sophia	98	78	152
Riley	79	86	113
Carl	69	62	72

Table 7

Hide Response Duration

Participant	Mean duration	Min duration	Max duration
Sophia	90	72	109
Riley	99	86	114
Carl	87	77	98

Riley

Riley's results are pictured in the second panel of Figure 1 shown earlier in this chapter. During all baseline sessions, Riley always began by engaging in a Hide response. She exited her instructional space with the simulated student (or student participant) and located a novel space of the classroom (e.g., workroom or storage space). After barricading her space with at least one piece of furniture (e.g., office chair), she would wait in her location for approximately 5-10 s. After engaging in these specific hiding behaviors, Riley would begin to engage in some responses listed on the Run checklist. Specifically, she would exit her hiding location after approximately 15 s and walk toward the nearest door to exit the building

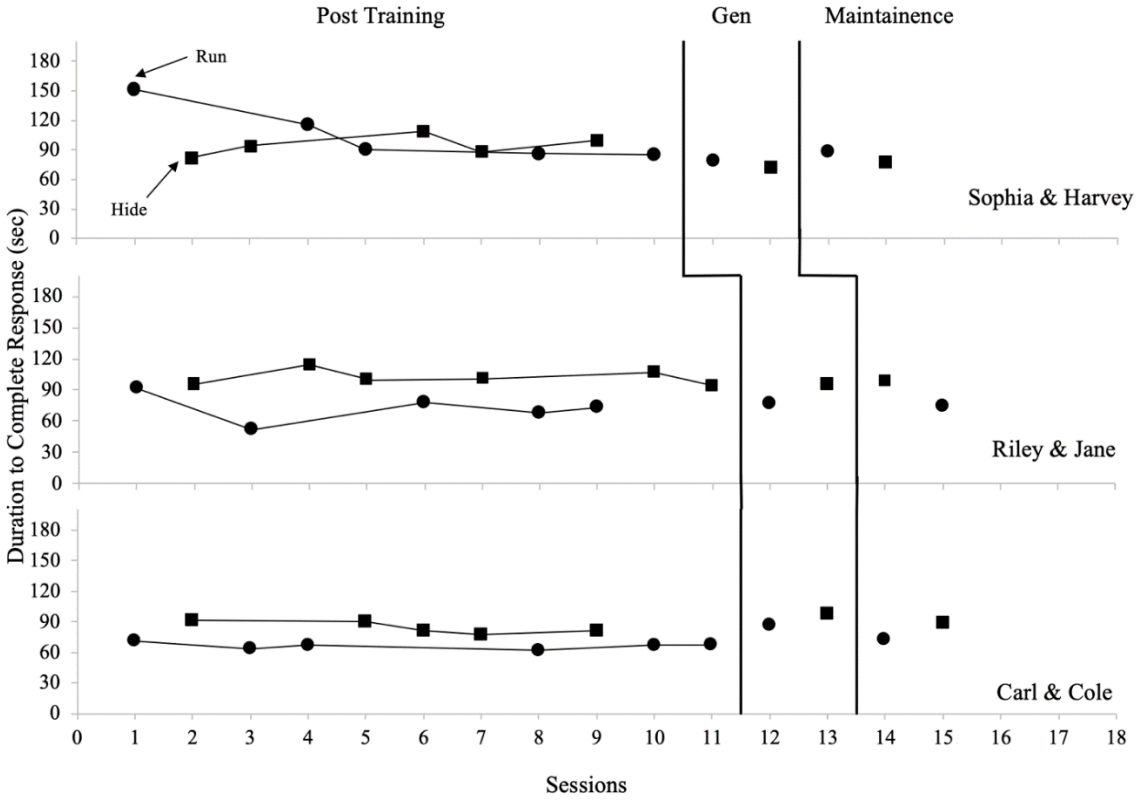

Figure 4. Duration (in seconds) to complete Run and Hide active shooter responses, across three participants.

with the simulated student (or student participant). Riley did not engage in any commenting to the simulated student, however, she did communicate directions to the student participant (e.g., “come over here” “this way”). After opening the door, but without exiting the building, Riley would tell the researcher, “I’m done” which would indicate the end of the session. Across each of the Run sessions during baseline, Riley correctly engaged in 20% of steps on the checklist. Across the Hide sessions during baseline, she correctly engaged in between 14% to 20% of steps on the checklist. These data were stable and occurred at low levels with a small increase at session 12.

Figures 2 and 3 shown earlier in this chapter depict an error analysis for the Run

and Hide responses for all participants. Similarly to the other participants, Riley made three common errors, early in the sequence of responses across both the Run and Hide responses. Specifically, carrying the emergency backpack, delivering an instruction to the student participant, and running the entire distance to the safe location did not occur.

After Riley completed the interactive computerized training, she immediately began selecting the correct Run or Hide response each time contingent on the information provided on the alert signal. Across each opportunity to engage in the Run response, she completed all actions correctly and at 100% criterion. Furthermore, Figure 4 and Table 4, represent the duration of Riley's Run responses across post-training sessions. On average, she completed the Run response in 79 s (range 52 – 113 s). During Riley's first session of the Hide response, she completed all actions within the checklist, except for barricading her location with furniture from the room. Riley's first Hide session was the lowest percentage of correctly implemented steps (i.e., 82%). Throughout the next five Hide sessions, Riley completed all actions correctly (i.e., met 100% criterion). Therefore, within the same day, Riley completed three Hide sessions after receiving the interactive computerized training. One reason why her performance increased dramatically, may be because she received multiple opportunities to practice the Hide response across days. Table 5 indicates that Riley completed the Hide response in an average of 99 s (range 86 – 114 s). We then conducted a Run and Hide generalization probe with the student participant present, rather than the simulated student. During these probes, Riley continued to engage in 100% correct responding across both the Run and Hide sessions. After 2 weeks, we conducted one Hide and two Run maintenance probes. Riley engaged

in 100% correct responding during the Hide probe, but engaged in 82% correct responding during the Run session. During this session, she completed all actions correctly, however, she did not specifically state what location she would run to, or what route she would take to get to that location. Rather, her response was too vague for the research assistants to code (i.e., “I would run the specific route to locate the specified safe spot”). Therefore, we conducted a second Run session, in which Riley described the response similarly. After Riley said, “I’m all done” the researcher asked her, “describe in more detail what route you would take and what location you would select,” After this additional information was delivered, Riley’s performance was scored at 100% correct.

Carl

Carl’s results are pictured in the last panel of Figure 1 as shown earlier in this chapter. During baseline sessions, Carl selected the correct Run or Hide response, when presented with this information on the alert signal. During the Hide response sessions, Carl would carry the simulated student to a hiding location outside of the individualized instructional area, however, he did not complete any of the response steps once in the location. During the Run response sessions, Carl would leave the individualized instruction areas and exit the building, at which point he would end the research session. Carl did not engage in delivering instructions to the simulated student, however he did instruct the student participant (e.g., “come here”) during baseline generalization probes. He demonstrated consistent responding across all baseline sessions and did not engage in varying responses. Across each of the Run sessions during baseline, Carl correctly

engaged in 20% of steps on the fidelity checklist. Across each of the Hide sessions during baseline, he correctly engaged in 14% of steps on the checklist.

After Carl completed the interactive computerized training, he continued to select the correct Run or Hide response contingent on the information provided on the alert signal. During his first Run response session, Carl engaged in 45% of the checklist correctly. He lost a significant number of points because he did not complete these steps at a running pace. His next sessions during the Run conditions all met criterion (above 90%). Within the same day, Carl completed three Run sessions after receiving the interactive computerized training. One reason why his performance increased dramatically, may be because he received multiple opportunities to practice the Run response across days. On average, he engaged in 90.1% of responses correctly across post-training sessions (range, 45% – 100%). Carl met criterion during all Hide response sessions during post-training (range, 98 – 100%). Across both the Run and Hide sessions during post-training, Carl demonstrated the most variability in responding, relative to the other participants. Researchers noticed that Carl would consistently lose points for not delivering the instruction (i.e., “time to go”) to the simulated student. However, he did state these instructions each time he completed either type of session with the student participant. Furthermore, Figure 4, represent the duration of Carl’s Run and Hide responses across post-training sessions. On average, he completed the Run response in 70 s (range 62 – 86 s) and the Hide response in 87 s (range 77 – 98 s), see Tables 4 and 5. We then conducted a Run and Hide generalization probe with the student participant present, rather than the simulated student. During these probes, Carl engaged in 100%

correct responding across both the Run and Hide sessions. During each of these sessions, Carl would state the instruction (i.e., “time to go”) to the student. After 2-weeks, we conducted one Hide and two Run maintenance probes. Carl engaged in 100% correct responding during the Hide response. During the Run response, again he did not engage in the delivery of instructions to the simulated student and obtained a 92% correct responding score.

Social Validity Measures

The parents of the student participants completed a side effects questionnaire prior to their child’s participation in the study and at the completion of the study. As listed in Table 8, no change was reported by any of the parents regarding the child’s behaviors in regards to attending the university preschool while research sessions were conducted. Specifically, all parents reported no changes when researchers asked them to indicate whether their child appeared to be more scared, cautious, or upset before arriving to school. None of the parents indicated any concerns in regards to their child’s behavior of attending the university preschool. Furthermore, all parents indicated that they were pleased with their child’s participation and were satisfied with the communication between the themselves and the researchers. None of the parents terminated their child’s participation in the study.

Sophia, Riley, and Carl completed the review of hard copy materials in 20, 12, and 25 min, respectively. Sophia, Riley, and Carl completed the interactive computerized training in 55 min, 69 min, and 55 min, respectively. Riley and Carl were the only

Table 8

Side-Effects Survey: Post Study Caregiver Responses

Student participant Instructor participant	Harvey (Sophia)	Jade (Riley)	Cole (Carl)
In regards to attending school, my child now appears **scared**:	No change	No change	No change
In regards to attending school, my child now appears **cautious**:	No change	No change	No change
In regards to attending school, my child now appears **upset**:	No change	No change	No change
How pleased are you that your child participated in this stud?	Neutral	Pleased	Pleased
How satisfied are you with the way the researchers have communicated what was going on throughout the study?	Satisfied	Satisfied	Satisfied

participants who followed the instructions within the module to practice walking the Run route to the safe location. All participants completed an Active Shooter Training Format survey, which asked the participants to rate their experience with the training materials. The survey was delivered after the instructor participants reviewed the materials, but before they completed any sessions for that condition. Specifically, the survey was delivered after the instructor participants had access to the hard copy manual and then again after they had exposure to the same hard copy manual, in addition to the interactive computerized training module.

Figure 5 represents the survey data for each instructor participant. After reviewing the hard copy manual only, all participants stated that they wanted more information about completing these actions when caring for individuals with a disability. After reviewing the interactive training module, all participants strongly agreed that the module was informative and maintained their interest. Furthermore, all participants indicted that the training materials clearly described and demonstrated correct responding to the Run

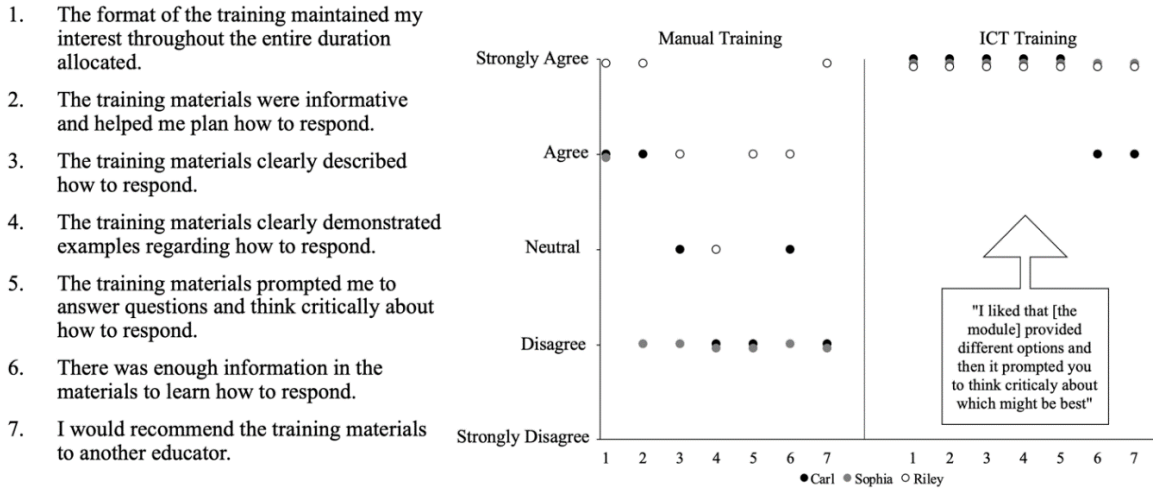

Figure 5. Active shooter training format survey responses across the three participants for the hard copy manual training and the manual plus ICT training materials.

and Hide active shooter situations. One participant noted, “I liked that the module prompted you to think critically about which option might be best” and another participant noted, “I loved the video examples,” Finally, all the participants indicated that they would recommend the training to other educators who are interested in learning how to respond during an active shooter emergency situation.

CHAPTER V

DISCUSSION

This study examined the effectiveness of an interactive computerized training module to teach educators how to respond to an active shooter emergency situation while caring for an individual diagnosed with autism spectrum disorder. We observed a dramatic increase in correct responding after the participants completed the computerized training across both responses. All participants met criterion in both the Run and Hide responses without any additional training or feedback from researchers. These responses were then generalized from the simulated student to the student participant during generalization sessions. Sophia demonstrated mastery criteria for both the Run and Hide responses within five sessions each. Riley also demonstrated mastery of the Run response within five sessions, but required a sixth session to master the Hide response. Carl met mastery criterion within five sessions for the Hide response, but required six sessions for the Run response. Finally, we continued to observe correct responding across both the Run and Hide responses after a 2-week maintenance probe.

The results also demonstrated that Sophia and Riley did not engage in the Run response at any time during baseline session. Each time they were provided with the alert that contained different information, they always implemented a Hide response within the classroom. This is important to note because the Run response is the best course of action when the situation permits. Previous literature indicates that the best way to prevent injury is to remove all persons from the unsafe location. Furthermore, after the completion of the modules, the participants selected the correct response given the

information provided on the alert sign. All participants completed the Run response in under 3 min and the Hide response in under 2 min.

This study is the first to teach educators how to respond to an active shooter situation using an interactive computerized training. When the three participants were provided with the written instruction manual, which contained all the same information as the modularized training, each of the participants did not engage in the correct responding. However, after the same training information was delivered in an interactive computerized format, all participants engaged in correct responding and met mastery criterion. Although previous research has demonstrated the utility of ICT to teach educators to implement Discrete Trial Instruction (DTI; Geiger et al. 2018), picture exchange communication system (PECS; Rosales et al., 2018), and play-based activity schedules (Gerencser et al., 2017), this study extends the research in ICT by teaching educators safety responses. The results of this study provide support for the use of ICT to teach educators how to implement two emergency responses with fidelity. Unlike previous research, all participants met criteria of implementation of the Run and Hide responses using the ICT module, without the use of additional feedback components (Gerencser et al. 2017; Pollard et al. 2014). Furthermore, all participants generalized the accuracy of implementation from a simulated student to the student participant.

This study taught educators to consider the details of an active shooter situation and select the appropriate response to increase the probability of survival. More importantly, the study discussed the specific needs of children diagnosed with autism spectrum disorder and how to accommodate those needs during an active shooter

situation. This training is important for participants because we taught educators to assess the information they are given about the active shooter's location and the resources in their location. Through critical thinking activities, the educators selected the best option available for themselves and their student. The researchers did not simply specifically the routes and locations the instructor participant should select.

Furthermore, the educators demonstrated correct responding with both the simulated student and the student participant. These actions speak to the generality of the behaviors they were taught during the module. Given the limited amount of research about the possible adverse effects of routinely practicing active shooter drills with actual students (Federal Commission on School Safety, 2018), this study provides evidence for utilizing a simulated student for emergency response skill acquisition. Teaching educators these responses using a simulated student may be a more efficient way to conduct these emergency trainings routinely without needlessly exposing students to these high stress situations.

The social validity measures were delivered to both the instructor participants and the caregivers of the student participants. First, we surveyed the instructor participants to determine their exposure to any active shooter response trainings. All instructor participants indicated that they had not received any training on this content in any form. This is notable given that there was an accidental emergency notification of an active shooter delivered to all students on the university campus a month before the start of the study. On the next social validity survey, the instructor participants were asked about their experiences interacting with the training content. The participants indicated that they

enjoyed the interactive computerized training module content and would recommend it to other educators. Furthermore, all participants completed the computer training in under 90 min. Given the importance of fluently engaging in these emergency responses at a moment's notice, the delivery method of these trainings should be preferred and easily to disseminate. Particularly, this format of delivery would lend itself to be utilized routinely if the educators do not perform to criterion after conducting an unexpected practice session. It is important to note that all participants were undergraduate students between the ages of 19 and 23 years old attending the university preschool. Therefore, this population may have demonstrated efficient acquisition of the training material and satisfaction of the training delivery because of their fluency with computerized trainings.

The social validity measure delivered to caregivers of student participants was used in this study to determine any side effects of the student's participation. Importantly, all parents indicated on this survey that there were not any notable side effects from their child's participation in the study. All caregivers reported that their child enjoyed attending the university preschool and did not demonstrate any adverse emotions, such as fear or anxiety, when taking them to school. Anecdotally, this may be because the student participants routinely participate in emergency drills, including active shooter drills, monthly at the university preschool. Alternatively, no side effects may have been demonstrated because of the student's limited participation in only four sessions (generalization probes prior to and after post training) across the study. The parents also indicated that they appreciated the amount of communication about study related procedures and did not consider removing the student's participation in the study at any

point.

We taught the participants how to increase probability of survival during an active shooter situation by selecting a Run or Hide response. Although the Fight response is recommended in some situations by law enforcement, that content was outside the scope of this study. By teaching the Run and Hide responses, we decreased the likelihood of educators needing to resort to a Fight response. Furthermore, we did not assess the educator's implementation of these Run or Hide responses in different locations across the university preschool building. For example, all sessions took place in the main classroom. Generalization of these skills could also be demonstrated across different classrooms within the building (e.g., school gym, outside playground, conference rooms, etc.).

Future research should determine the generality of this interactive modularized training content across different organizations within the same university and across other universities that provide similar services to individuals with ASD. Although some university preschool specific locations were described within the module, it is possible that different organizations can view this module and generalize the location selecting procedure to their own organization layout. Furthermore, variations of this training can also be used to determine the extent to which the training content can be explicitly customized for other organizations. It is possible to retain a majority of the content for which the educator critically thinks about the concepts, but modify the content to provide specific sections within the module where the organization's administrators explicitly lists the specific for their locations (e.g., one slide at the end of the hiding response to

state what location to barricade).

Additionally, the module content was designed to teach individual instructors to respond to active shooter situations with their student. Because the university preschool has a ratio of one student to one educator, this was a feasible design for this study. This content did not review group responding procedures, which may be more common within organizations in which the ratio of students to teachers is much higher. Responding under those conditions are different and require additional decision making. For example, educators in this study carried the student to the safe location. However, this would not be feasible if each educator cared for more than one student. Also, educators caring for more than one student are encouraged to spread out hiding locations across the classroom. In which case, the instructor could not be present in each location. In a similar manner, this ICT module did not address how decisions are made within a hieratical organizational structure. If there are multiple individuals who are administrators in one organization, it would be important to designate one person to make decisions for the group within the organization (Federal Commission on School Safety, 2019). Any possibility of disagreement amongst administrators could delay the survival actions for everyone.

Furthermore, the module content did not review what actions the participant should engage in when they do not have any information on the location of the active shooter. In many situations, organizations notify individuals that there may be an active shooter in the vicinity, but the information about the specific location is not delivered for minutes after the initial announcement. More research is needed for administrators to

decide which action to select (e.g., Run, Hide, or Fight) given the information provided to them (e.g., distance or location of the shooter). Currently, administrators are encouraged to make those decisions internally for their organization without evidence of the variables that made the response successful. In a review by Dagenhard et al. (2019), one middle school began evacuating students after the first shot was heard, while in a similar situation another elementary school began to hide at the first sound of gunfire. In both situations, the administrators were successful at decreasing the number of victims in those classes. Specific variables, such as the population age, ratio of students to teachers, size of the classroom, and how often the administrators and students practice these procedures, may be useful variables to assess when planning which action to select during active shooter situations.

Related to the importance of designing an individualized protocol for each organization, is the necessity to protect the information described within that protocol from individuals outside of the organization. Training protocols within the university preschool organization was only shared with educators and administrators. Some specifics of the protocol were not shared with parents or guests of the organization. Therefore, specific location and details of the university preschool have been renamed within the description above.

Lastly, as the location of the active shooter changes, so should the responses for which the educator engages. Dynamic responding given the changing information provided to the individuals involved in these situations is necessary for successful responding. For example, a combination of Run and Hide responses may be needed in an

actual active shooter emergency. As the location and distance of the active shooter to the students, as well as the number of fatalities and access resources changes, so should the responses by the students and administrator. Flexibility between using one or both responses should be an extension to future research.

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APPENDICES

Appendix A

Active Shooter Training Survey

Active Shooter Training Survey

1. How long have you been volunteering at the ASSERT university preschool program?

2. What information have you received on the topic of active shooter training?

3. In what format has that training(s) been delivered (e.g., in-person didactic training, hard copies of written instructions, online videos, online documents, etc.)?

4. How long ago was this training completed?

5. Did you enjoy the training formats described above?

Thank you for taking the time to complete this survey!

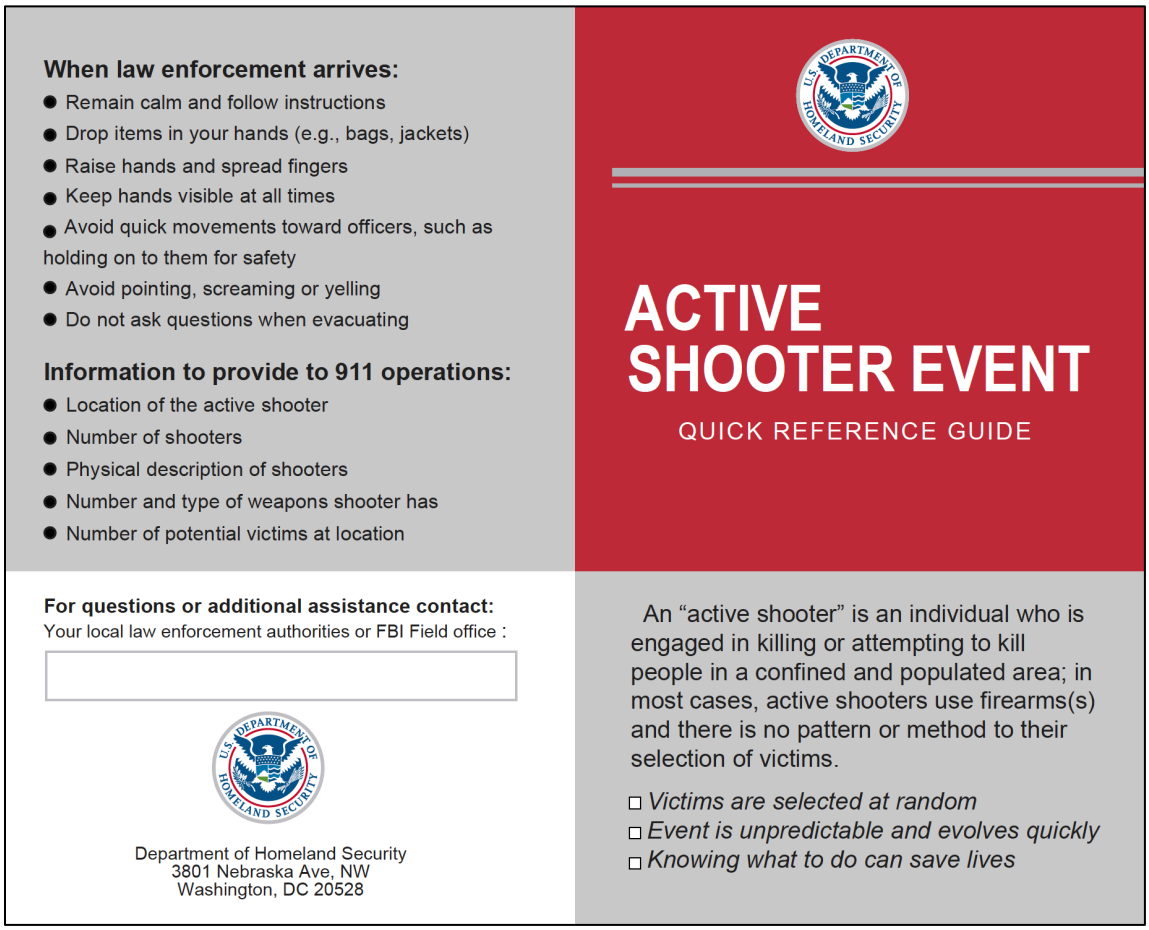
Given the importance of this content, please avoid seeing additional information/training materials about this topic.

Appendix B

Government Provided Training Materials and Organization Decisions Flow Chart

U.S. Department of Homeland Security (2008). Active shooter – How to Respond. Available at: https://www.dhs.gov/sites/default/files/publications/active-shooter-how-to-respond-2017-508.pdf

Department of Homeland Security Training Pamphlet



When law enforcement arrives:

- Remain calm and follow instructions
- Drop items in your hands (e.g., bags, jackets)
- Raise hands and spread fingers
- Keep hands visible at all times
- Avoid quick movements toward officers, such as holding on to them for safety
- Avoid pointing, screaming or yelling
- Do not ask questions when evacuating

Information to provide to 911 operations:

- Location of the active shooter
- Number of shooters
- Physical description of shooters
- Number and type of weapons shooter has
- Number of potential victims at location

For questions or additional assistance contact:
Your local law enforcement authorities or FBI Field office :

Department of Homeland Security
3801 Nebraska Ave, NW
Washington, DC 20528

ACTIVE SHOOTER EVENT

QUICK REFERENCE GUIDE

An "active shooter" is an individual who is engaged in killing or attempting to kill people in a confined and populated area; in most cases, active shooters use firearms(s) and there is no pattern or method to their selection of victims.

- ☐ *Victims are selected at random*
- ☐ *Event is unpredictable and evolves quickly*
- ☐ *Knowing what to do can save lives*

ACTIVE SHOOTER EVENTS

When an Active Shooter is in your vicinity, you must be prepared both mentally and physically to deal with the situation.

You have three options:

1 RUN

- Have an escape route and plan in mind
- Leave your belongings behind
- Evacuate regardless of whether others agree to follow
- Help others escape, if possible
- Do not attempt to move the wounded
- Prevent others from entering an area where the active shooter may be
- Keep your hands visible
- Call 911 when you are safe

2 HIDE

- Hide in an area out of the shooter's view
- Lock door or block entry to your hiding place
- Silence your cell phone (including vibrate mode) and remain quiet

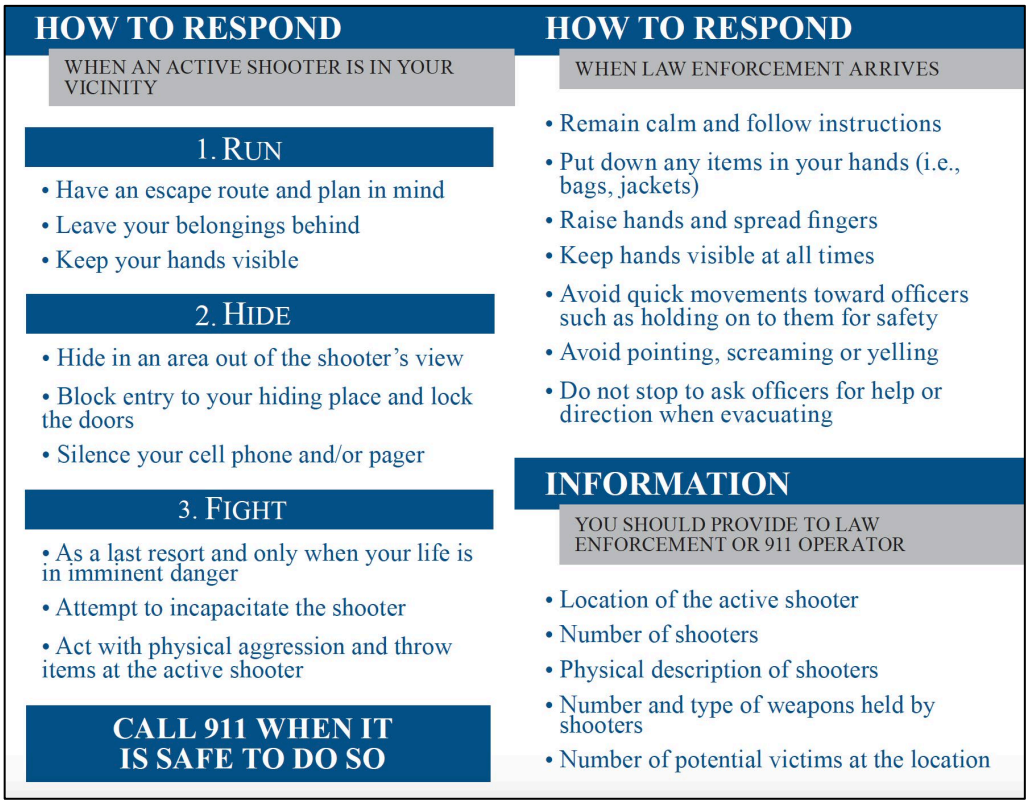
3 FIGHT

- Fight as a last resort and only when your life is in imminent danger
- Attempt to incapacitate the shooter
- Act with as much physical aggression as possible
- Improvise weapons or throw items at the active shooter
- Commit to your actions . . . your life depends on it

The first officers to arrive on scene will not stop to help the injured. Expect rescue teams to follow initial officers. These rescue teams will treat and remove injured.

Once you have reached a safe location, you will likely be held in that area by law enforcement until the situation is under control, and all witnesses have been identified and questioned. Do not leave the area until law enforcement authorities have instructed you to do so.

Department of Homeland Security Training Badge/Pocket Card



HOW TO RESPOND

WHEN AN ACTIVE SHOOTER IS IN YOUR VICINITY

1. RUN

- Have an escape route and plan in mind
- Leave your belongings behind
- Keep your hands visible

2. HIDE

- Hide in an area out of the shooter's view
- Block entry to your hiding place and lock the doors
- Silence your cell phone and/or pager

3. FIGHT

- As a last resort and only when your life is in imminent danger
- Attempt to incapacitate the shooter
- Act with physical aggression and throw items at the active shooter

CALL 911 WHEN IT IS SAFE TO DO SO

HOW TO RESPOND

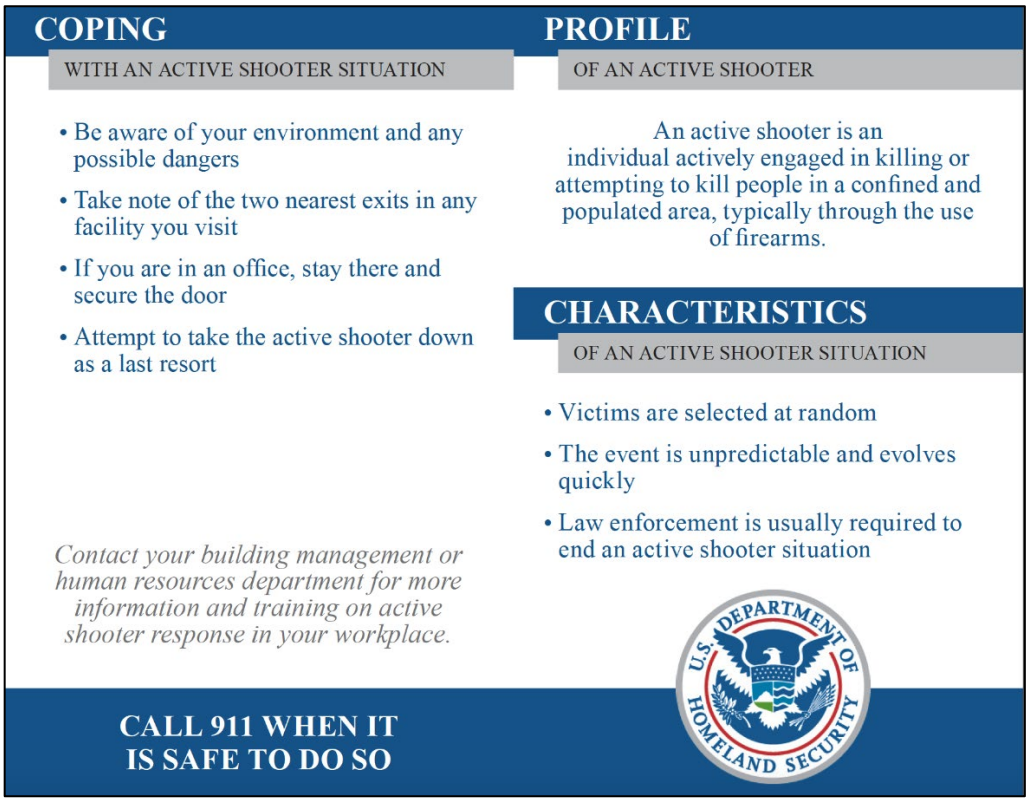
WHEN LAW ENFORCEMENT ARRIVES

- Remain calm and follow instructions
- Put down any items in your hands (i.e., bags, jackets)
- Raise hands and spread fingers
- Keep hands visible at all times
- Avoid quick movements toward officers such as holding on to them for safety
- Avoid pointing, screaming or yelling
- Do not stop to ask officers for help or direction when evacuating

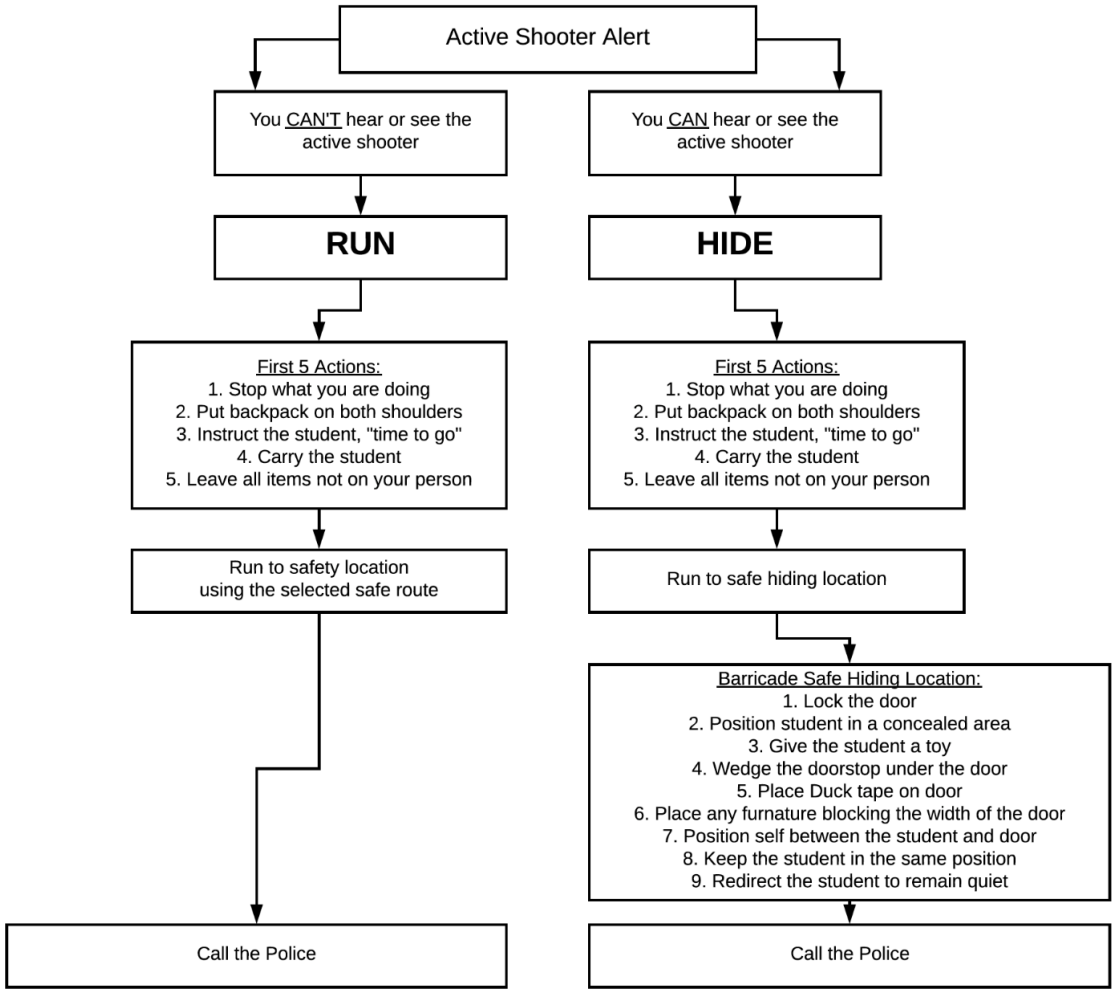
INFORMATION

YOU SHOULD PROVIDE TO LAW ENFORCEMENT OR 911 OPERATOR

- Location of the active shooter
- Number of shooters
- Physical description of shooters
- Number and type of weapons held by shooters
- Number of potential victims at the location


COPING
WITH AN ACTIVE SHOOTER SITUATION
• Be aware of your environment and any possible dangers
• Take note of the two nearest exits in any facility you visit
• If you are in an office, stay there and secure the door
• Attempt to take the active shooter down as a last resort
Contact your building management or human resources department for more information and training on active shooter response in your workplace.
PROFILE
OF AN ACTIVE SHOOTER
An active shooter is an individual actively engaged in killing or attempting to kill people in a confined and populated area, typically through the use of firearms.
CHARACTERISTICS
OF AN ACTIVE SHOOTER SITUATION
• Victims are selected at random
• The event is unpredictable and evolves quickly
• Law enforcement is usually required to end an active shooter situation
U.S. DEPARTMENT OF HOMELAND SECURITY
CALL 911 WHEN IT IS SAFE TO DO SO

Active Shooter Response Flow Chart



Appendix C

Alert Signal

ALERT: Active shooter on campus. You can see or hear the active shooter.

ALERT: Active shooter on campus. You can't see or hear the active shooter.

Appendix D

Simulated Student

Appendix E

Run Checklist - Data Sheet

Run Checklist - Data Sheet

Participant: _____ Date: _____ Session #: _____ Data Collector: _____ P / IOA

Session Type: _____ Start Time: _____ End Time: _____

Category	Run - Action/Items	+/-	Point	Total	Time
Proactive	Identification badge visible		1		
Items taken	Within 5 seconds of the notification, stop current action place instructional items on the table or floor		3		*
	Child remains within arms distance of the participant until end of session (offset of 3 sec)		5		*
	Place emergency backpack on both shoulders before leaving the cubby and remains on participant until within a safety location		5		*
	Avoids picking up any other items (except emergency backpack and child) before leaving the cubby. Leaves all items not on their person at the time of the alert.		1		
Comm	Tell student, "It's time to go" before moving the student		1		*
	Remain silent, unless communicating to the student instructions in a whisper.		5		
	Redirect student to stay quiet or use a whisper voice each time the student makes a noise. Indicate N/A if the student doesn't make any vocalizations.		5		*
Transport method	Run the entire distance to safe location (offset of 3 sec)		5		*
	Carry student		3		
	Hold the child's hand		1		
	All other methods		0		
Transport Duration	Locate a concealed area outside of the classroom building within 3 min of the alert		5		*
Route to terminal location	Red Route		3		
	Orange Route		1		
	Other Routes		0		
Terminal location	Gym		5		
	City Park		3		
	Athletics Field		1		
	Any other locations		0		
Action in location	Position child in a concealed area outside of the classroom building		1		*
	Call emergency personnel		1		*
% correct responding = Response points / Total Points =					
Total Duration					

Appendix F

Hide Checklist - Data Sheet

Hide Checklist - Data Sheet

Participant: _____ Date: _____ Session #: _____ Data Collector: _____ P / IOA

Session Type: _____ Start Time: _____ End Time: _____

Category	Hide - Action/Items	+/-	Point	Total	Time
Proactive	Identification badge visible		1		
Items taken	Within 5 seconds of the notification, stop current action place instructional items on the table or floor		3		*
	Child remains within arms distance of the participant until end of session (offset of 3 sec)		5		*
	Place emergency backpack on both shoulders before leaving the cubby and remains on participant until within a safety location		5		*
	Avoids picking up any other items (except emergency backpack and child) before leaving the cubby. Leaves all items not on their person at the time of the alert.		1		
Comm	Tell student, "It's time to go" before moving the student		1		*
	Remain silent, unless communicating to the student instructions in a whisper.		5		
	Redirect student to stay quiet or use a whisper voice each time the student makes a noise. Indicate N/A if the student doesn't make any vocalizations.		5		*
Transport method	Run the entire distance to safe location (offset of 3 seconds)		5		*
	Carry student		3		
	Hold the child's hand		1		
	All other methods		0		
Transport Duration	Locate a concealed area outside of student's instructional area within 30s of the alert		5		*
	Complete all steps of the barricade procedures in the safe location within 2.5 min of the alert		3		
Terminal location	Storage room		5		
	Office		3		
	Any research rooms		1		
	Any other locations		0		
Barricade	Lock door by removing magnet or with keys		5		*
	Position child in concealed area		1		*
	Give child tangible (from shelf or backpack)		1		*
	Use doorstop		1		*
	Use tape		5		*
	Place furniture by the door (covering the length of the door's width)		3		*
	Position self between child and doors/windows		5		
	Child remains in same location through the end of the research session or the instructor attempts to keep the child in the same location		1		*
	Call emergency personnel		1		*
% Correct Responding = Response points / Total Points =					

Appendix G

Training Format: Social Validity Questionnaire

Training Format: Social Validity Questionnaire

Thank you for participating in the training on how to respond during an active shooter situation. We are interested in your honest opinion about your experience during the training.
Please answer all the questions below.

1. **The format of the training maintained my interest throughout the entire duration allocated.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

2. **The training materials were informative and helped me plan how to respond during an active shooter situation while caring for a student with autism spectrum disorder.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. **The training materials clearly described how to respond to an active shooter when caring for a student with autism spectrum disorder.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. **The training materials clearly demonstrated examples regarding how to respond during an active shooter situation when caring for a student with autism spectrum disorder.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. **The training content prompted me to answer questions and think critically about how to respond during an active shooter situation when caring for a student with autism spectrum disorder.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. **There was enough information in the materials to learn how to respond during an active shooter situation when caring for a student with autism spectrum disorder.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

7. **I would recommend the training materials to another educator who is interested in learning how to respond to an active shooter situation when caring for a student with autism spectrum disorder.**

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

8. **What features of the training did you enjoy the most?**

9. **What content did you find to be difficult to understand?**

10. **What comments or suggestions do you have for future modifications to the training modules?**

Thank you for taking the time to complete this survey!

Appendix H

Side-Effects Survey (Pre and Post)

Side-Effects Survey – PRE

Adapted from Johnson, Miltenberger, Egemo-Helm, Jostad, Flessner, & Gatheridge (2005)

Name: _____ Child's Name: _____ Date: _____

Directions: Please answer the following questions honestly and to the best of your ability. Provide as much detail as possible and avoid leaving any questions unanswered. Please ask if you have any questions.

1. **In regards to attending school and compared to previous weeks attending school, my child now appears:**
   a. *Scared:* afraid to leave parents or show fear of teachers and instructors at the university preschool.

Much more scared	A little more scared	No change	Less scared	Much less scared

   b. *Cautious:* hesitant to go to the university school.

Much more cautious	A little more cautious	No change	Less cautious	Much less cautious

   c. *Upset*: concerned about the issue of personal safety at school.

Much more upset	A little more upset	No change	Less upset	Much less upset

2. **Some concerns I noted about my child's behavior in regards to attending school are:**
   a. Please describe or mark N/A if there has not been any recent changes observed in your child's behavior.

3. **How pleased are you that your child will be participating in the study?**

Very pleased	Pleased	Neutral	Disappointed	Very disappointed

4. **How satisfied are you with the way the researchers have communicated what will go on throughout the study?**

Very satisfied	Satisfied	Neutral	Unsatisfied	Very unsatisfied

5. **Are you considering terminating your child's participation in the study? Yes or No**
   a. If yes, please explain why:

6. **Please note any additional comments you have about the study:**

Thank you for taking the time to complete this survey!

Date Delivered: _____ *Date Returned:* _____

Side-Effects Survey - POST

Adapted from Johnson, Miltenberger, Egemo-Helm, Jostad, Flessner, & Gatheridge (2005)

Name: _____ Child's Name: _____ Date: _____

Directions: Please answer the following questions honestly and to the best of your ability. Provide as much detail as possible and avoid leaving any questions unanswered. Please ask if you have any questions.

1. **In regards to attending school and compared to before participating in this study, my child now appears:**
    a. *Scared:* afraid to leave parents or show fear of teachers and instructors at the university preschool.

Much more scared	A little more scared	No change	Less scared	Much less scared

    b. *Cautious:* hesitant to go to the university school.

Much more cautious	A little more cautious	No change	Less cautious	Much less cautious

    c. *Upset*: concerned about the issue of personal safety at school.

Much more upset	A little more upset	No change	Less upset	Much less upset

2. **Some concerns or changes I noted about my child's behavior in regards to attending school are:**
    a. Please describe or mark N/A if there have not been any recent changes observed in your child's behavior.

3. **How pleased are you that your child has participated in the study?**

Very pleased	Pleased	Neutral	Disappointed	Very disappointed

4. **How satisfied are you with the way the researchers have communicated what has gone on throughout the study?**

Very satisfied	Satisfied	Neutral	Unsatisfied	Very unsatisfied

5. **Did you terminate your child's participation in the study? Yes or No**
    a. If yes, please explain why:

6. **Please note any additional comments you have about the study:**

Thank you for taking the time to complete this survey!

Date Delivered: _____ *Date Returned:* _____

Appendix I

Procedure Integrity – Research Sessions

Procedure Integrity – Research Sessions

Data Collector: _____ Participant: _____ Researcher: _____

Session Date: _____ Session Type: _____ Session #: _____

Directions: Mark whether the researcher correctly completed each component.

1. Alert signal was provided on the signal board
   Yes No N/A

2. The correct information on the signal was presented
   Yes No N/A

3. The researcher who is video recording remains unobtrusive to the participant's actions by staying at least 10 feet away from the participant and not engaging in any vocal statements
   Yes No N/A

4. The simulated child and backpack, with all required materials, are located in the participants instructional area prior to the start of the session
   Yes No N/A

5. All research locations are available, supplied with the research materials, and not occupied by other students or educators.
   Yes No N/A

Treatment Integrity Percentage: Total (# of yeses/5) = ___/___ *100 = ____%

Appendix J

Treatment Integrity – ICT

Treatment Integrity – ICT

Data Collector: _____ Participant: _____ Researcher: _____

Session Date: _____ Session Type: _____ Session #: _____

Directions: Mark whether the researcher correctly completed each component.

1. The module was started on the computer and no other programs were open
   Yes No N/A

2. Hard copy training manual, a blank sheet of paper, and pencil placed on the table
   Yes No N/A

3. Earphones were connected to the computer
   Yes No N/A

Treatment Integrity Percentage: Total (# of yeses/3) = ___/___ *100 = ____%

CURRICULUM VITAE

LORRAINE A. BECERRA

EDUCATION

Ph.D. Disabilities Disciplines, **Utah State University, Logan, UT**
May 2019 Advisor: **Thomas S. Higbee,** Ph.D., BCBA-D
Dissertation: An Evaluation of an Interactive Computerized Training to Teach Instructors How to Respond During an Active Shooter Situation

M.A. Behavioral Clinical Psychology, **California State University,**
July 2014 **Northridge, CA**
Advisor: **Tara A. Fahmie**, Ph.D., BCBA-D
Thesis: An Analysis of Two Modifications to the Multiple Stimulus Without Replacement Preference Assessment Format

B.A. Psychology, **University of California, Los Angeles, CA**
June 2010 Advisors: **Andrew Fuligni**, Ph.D. & **Scott Johnson**, Ph.D.
Thesis: An Evaluation of Infant Perception and Preference for Stimuli
Thesis: Micro-Aggressions in the Daily Lives of Diverse High School Students

PROFESSIONAL CERTIFICATION

Licensed Behavior Analyst	**September 2015**
Board Certified Behavior Analyst (1-14-17784)	**December 2014**
Educating Students with Autism Spectrum Disorders	**August 2012**
Crisis Prevention Institute (CPI)	**August 2019**
CPR Certified	**September 2019**

AREAS of SPECIALIZATION

Early intensive behavioral intervention curriculum design, social and safety skills, functional analysis methodology, function-based interventions, autism spectrum disorder

RESEARCH GRANTS and FUNDING

Title: 2019 Public Awareness Grant
Sponsor: Society for the Advancement of Behavior Analysis (SABA)
Total Funded: $2,500.00
Date: May 2019

Title: Personnel Development to Improve Services and Results for Children with a Disability
Principle Investigator: Robert Morgan, PhD
Sponsor: U.S. Department of Education

Amount Funded: $1,239,461.00
Date: January 2016

TEACHING EXPERIENCE

Co-Instructor – Utah State University, Logan, UT **Fall 2018**
SPED 6710: Concepts and Principles of Behavior Analysis in Education - Graduate

Instructor – Distance Education - Utah State University, Logan, UT **Spring 2018**
SPED 5010: Applied Behavior Analysis 1: Principles, Assessment, and Analysis - Undergraduate

Instructor – Distance Education – Utah State University, Logan, UT **Fall 2015**
SPED 6780: Ethics and Applied Behavior Analysis - Graduate

Graduate Teaching Assistant – Utah State University, Logan **Fall 2017, Spring 2016**
SPED 6710: Concepts and Principles of Behavior Analysis in Education - Graduate

Graduate Teaching Assistant – Utah State University, Logan, UT **Fall 2016, Fall 2015**
SPED 5010: Applied Behavior Analysis 1: Principles Assessment, and Analysis - Undergraduate

Graduate Teaching Assistant – Utah State University, Logan, UT **Summer 2015**
SPED 6780: Ethics - Graduate

Graduate Teaching Assistant – Utah State University, Logan, UT **Spring 2015**
SPED 6730: Educational Applications of Behavior Analysis II - Graduate

Graduate Teaching Assistant – California State University, Northridge, **Spring 2014**
PSY 555: Assessment in Applied Behavior Analysis - Graduate

Graduate Teaching Assistant – California State University, Northridge **Fall 2013**
PSY 406: Developmental Psychopathology - Undergraduate

Graduate Teaching Assistant – California State University, Northridge **Spring 2013**
PSY 351: Behavior Psychology and Therapy - Undergraduate

PUBLICATIONS

Becerra, L.A., Higbee, T.S., Cousin, S., & Kelley, K. (in press). An evaluation of the effectiveness of textual and auditory script presentations to children with autism. *Journal of Applied Behavior Analysis.*

Becerra, L.A., Sellers, T., & Contreras, B. (2019). Utilize the conference experience: Tips to navigate academic conferences early in professional careers. *Behavior Analysis in Practice.*

Pellegrino, A.P., Higbee, T.S., **Becerra, L.A.,** & Gerencser, K.R. (2019). Comparing stimuli delivered via tablet vs. flashcards on receptive labeling in children with autism. *Journal of Behavioral Education.*

Gerencser, K., Akers, J., **Becerra, L.A**., Higbee, T.S., & Sellers, T. (2019). Training Service Providers to Implement Behavior Analytic Interventions: A Review of Asynchronous Training. *Journal of Behavioral Education.*

Becerra, L.A., Higbee, T. S., Galizio, A., Mattson, S.L., Reinert, K.S., & Aguilar, J. (under review). An evaluation of an interactive computerized training to teach instructors how to respond during an active shooter situation. *Journal of Applied Behavior Analysis.*

Becerra, L.A., Higbee, T.S., Pellegrino, A.J., & Hobson, K. (under review). The effect of photographic activity schedules on moderate-to-vigorous physical activity in children with autism. *Journal of Applied Behavior Analysis.*

Trevisan, D. **Becerra, L.A.,** Benitez, P., Higbee, T.S., & Gois, J.P. (under review). Technology Interventions: A review of the use of technology in Applied Behavior Analysis. *Computers in Human Behavior*.

PUBLICATIONS (IN PREPARATION)

* Publication in preparation are those in which data collection has been completed

***Becerra, L.A.,** Sellers, T.P., & Pellegrino, A.J. (in preparation). Abduction prevention skills for children and adults with disabilities: A systematic review.

*Pellegrino, A.J., Higbee, T.S., **Becerra, L.A.**, Nix, L.D., Hobson, K., & Reinert, K.S. (in preparation). Promoting sociodramatic play between children with autism and their typically developing peers using activity schedules.

*Higbee, T.S., Mary Katherine, E.H., Heaps, A.H., & **Becerra, L.A.,** (in preparation). An Analysis of Variability of Play Behavior with Preschool Children with Autism.

*Contreras, B.C., Higbee, T.S., Galizio, A., Pellegrino, A.J., **Becerra, L.A.,** & Heaps, A.H. (in preparation). Promoting generalization of varied play behavior with children with autism.

***Becerra, L.A.,** Higbee, T.S., Cousin, S., Barboza, A., Mattson, S., & Reinert, K., (in preparation). An evaluation of the effects of an interactive computerized training (ICT) to teach preschool instructors the natural language paradigm (NLP).

Becerra, L.A., Higbee, T.S., Cousin, S., Barboza, A., Mattson, S., & Reinert, K., (in progress). An evaluation of the effects of an interactive computerized training (ICT) to teach parents and siblings the natural language paradigm (NLP).

PROFESSIONAL PRESENTATIONS

Becerra, L.A., Higbee, T.S., Vieira, M.C., Pellegrino, A.J., Hobson, K., & Aguilar, J. (2019, August). The Effects of Photographic Activity Schedules on Moderate-to-Vigorous Physical Activity in Children with Autism Spectrum Disorder. Poster presented at the Utah Association for Behavior Analysis (UtABA). Salt Lake City, UT.

Becerra, L.A., Higbee, T.S., Vieira, M.C., Pellegrino, A.J., & Hobson, K (2019, May). The Effects of Photographic Activity Schedules on Moderate-to-Vigorous Physical Activity in Children with Autism Spectrum Disorder. Paper presented at the Association for Behavior Analysis International (ABAI). Chicago, Il.

Becerra, L.A., Higbee, T.S., Vieira, M.C., Pellegrino, A.J., & Hobson, K (2019, February). The Effects of Photographic Activity Schedules on Moderate-to-Vigorous Physical Activity in Children with Autism Spectrum Disorder. Paper presented at the California Association for Behavior Analysis (CalABA) 37th Annual Western Regional Conference on Behavior Analysis. Long Beach, CA.

Becerra, L.A., Higbee, T.S., Kelley, K., & Cousin, S. (2019, February). An Evaluation of the Effectiveness of Textual and Auditory Presentation of Scripts to Children with Autism Spectrum Disorder. Paper presented at the California Association for Behavior Analysis (CalABA). Long Beach, CA.

Becerra, L.A., Higbee, T.S., Kelley, K., & Cousin, S. (2018, August). An Evaluation of the Effectiveness of Textual and Auditory Presentation of Scripts to Children with Autism Spectrum Disorder. Poster presented at the Utah Association for Behavior Analysis (UtABA). Salt Lake City, UT.

Becerra, L.A., Higbee, T.S., Kelley, K., & Cousin, S. (2018, May). An Evaluation of the Effectiveness of Textual and Auditory Presentation of Scripts to Children with Autism Spectrum Disorder. Paper presented at the Association for Behavior Analysis International (ABAI). San Diego, Ca.

Becerra, L.A. (2018, April). An Evaluation of the Effectiveness of Textual and Auditory Presentation of Scripts to Children with Autism Spectrum Disorder. Paper presented at the Utah State University Research Week, Logan, UT.

Becerra, L.A. & Heaps, A. (2018, March). Addressing Challenging Behaviors and Building Compliance. Utah Regional Leadership Education in Neurodevelopmental Disabilities (URLEND) Program, Utah State University, Logan, UT.

Becerra, L.A., Heaps, A., & Higbee, T.S. (2017, June). Commonsense Strategies for Data Collection. Paper presented at The Utah Multi-Tiered Supports (UMTSS) Conference. Provo, UT.

Becerra, L.A. (2017, May). Advancements in Teaching Appropriate Play Skills to Individuals with Autism Spectrum Disorders. Paper presented at the Association for Behavior Analysis International (ABAI). Denver, Co.

Becerra, L.A. & Heaps, A. (2017, March). Introduction to Discrete Trial Instruction for Inividuals with a Disability. Utah Regional Leadership Education in Neurodevelopmental Disabilities (URLEND) Program, Utah State University, Logan, UT.

Becerra, L.A., Heaps, A. & Higbee, T.S. (March, 2017). *Assessment and treatment of challenging behavior and promoting complains in children with autism.* Presentation for the Utah Regional Leadership Education in Neurodevelopmental Disabilities. Utah State University. Logan, UT.

Becerra, L.A. (2017, February). Advancements in Teaching Appropriate Play Skills to Individuals with Autism Spectrum Disorders. Paper presented at the California Association for Behavior Analysis (CalABA). Anaheim, CA.

Pellegrino, A.J., Higbee, T.S., Gerencser, K.R., & **Becerra, L.A.** (February, 2017). *A comparison between presenting receptive language stimuli on a tablet vs. flashcards*. Paper presented at the 35th Annual California Association for Behavior Analysis Western Regional Conference, Anaheim, CA.

Becerra, L.A. & Pellegrino, A. J. (2016, June). Building Functional Communication for Individuals with Developmental Disabilities. Paper presented at The Utah Multi-Tiered Supports (UMTSS) Conference. Salt Lake City, UT.

Pellegrino, A.J., Higbee, T.S., Gerencser, K.R., & **Becerra, L.A.** (May, 2016). *A comparison between presenting receptive language stimuli on a tablet vs. flashcards*. Paper presented at the 42nd Annual Convention of the Association for Behavior Analysis International, Chicago, IL.

Higbee, T.S., & **Becerra, L.A.** (March, 2016). *Introduction to discrete trial teaching.* Presentation for the Utah Regional Leadership Education in Neurodevelopmental Disabilities (URLEND). Utah State University. Logan, UT.

Gerencser, K.R., Higbee, T.S., & **Becerra, L.A.** (2015, June). A Component Analysis of a Procedure to Reduce Toe Walking for Children with Autism. Poster presented at the Utah Association for Behavior Analysis conference (UtABA), Salt Lake, UT.

Becerra, L.A., Fahmie, T.A., Phang, J., Swanson, M. A., & Smith, S. (2015, February). An Analysis of Two Modifications to the MSWO Preference Assessment Format. Paper presented at the California Association for Behavior Analysis conference (CalABA), San Diego, CA.

Lee, J.K., **Becerra, L.A.,** & Foy, P. (2014, July). Barriers to Effective PCIT Completion

in Community Mental Health Settings. Paper presented at the Parent-Child Interaction Therapy Conference (PCIT), Los Angeles, CA.

Becerra, L.A., Wang, E., Ortiz, A., & Fields, A. (2014, July). Defining and Promoting Resiliency and Prevention Programs in At-Risk Communities. Paper presented at the International Conference & Summit on Violence, Abuse, & Trauma Conference (IVAT), San Diego, CA.

Becerra, L.A. & Fahmie, T.A. (2014, May) A review and analysis of the consistency of MSWO assessments. Paper presented at the Association for Behavior Analysis International conference (ABAI), Chicago, IL.

Becerra, L.A., Phang, J., Smith, S., & Fahmie, T.A. (2014, February) A review and analysis of the consistency of MSWO assessments. Poster presented at the California Association for Behavior Analysis conference (CalABA), Burlingame, CA.

Wolf, K., Lee, J., & **Becerra, L.A.,** (May, 2013). Practical Applications: A Centralized System for Evaluation, Paper presented at the California Mental Health Advocates for Children and Youth (CHMACY). Pacific Grove, CA.

INVITED TALKS

Becerra, L.A., Pellegrino, A.J., & Higbee, T.S. (November, 2017). Developmental Disabilities and Applied Behavior Analysis. Guest lecture for undergraduate abnormal psychology, Utah State University, Logan, UT

Becerra, L.A. & Hobson, K. (September, 2017). Understanding Behavior: General strategies to promote success. Guest two-part lecture for Master's level Music Therapy students and faculty. Utah State University, Logan, UT.

Becerra, L.A., & Higbee, T.S. (March, 2017). *Assessing and Managing Challenging Behavior while Building Compliance.* Guest lecture for undergraduate special education practicum students. Utah State University, Logan, UT.

Becerra, L.A. (November, 2016). *Characteristics, prevalence, and treatment of autism spectrum disorders*. Guest lecture for undergraduate Early Childhood Alternative Teacher Preparation Program (ECATP). Utah State University, Logan, UT.

Pellegrino, A.J., **Becerra, L.A.,** & Higbee, T.S. (March, 2016). *Advanced discrete trial teaching.* Guest lecture for undergraduate special education practicum students. Utah State University, Logan, UT.

Becerra, L.A. (March, 2016). Characteristics, prevalence, and treatment of autism spectrum disorders. Guest lecture for undergraduate introduction to special education students, Utah State University, Logan, UT.

Contreras, B.C., & **Becerra, L.A.** (February, 2016). *Characteristics, prevalence, and treatment of autism spectrum disorders*. Guest lecture for undergraduate Interdisciplinary Disability Awareness and Service Learning (IDASL). Utah State University, Logan, UT.

Becerra, L.A. & Harris, K. (October, 2015). Understanding Behavior: General strategies to promote success. Guest two-part lecture for Master's level Speech and Language Pathology students and faculty. Utah State University, Logan, UT.

Pellegrino, A.J., & **Becerra, L.A.** (October, 2015). *Environmental supports*. Guest lecture for undergraduate special education students. Utah State University, Logan UT.

Becerra, L. (April 2014). Advanced Inquiry in Clinical/Personality Psychology, CSUN, CA.

Becerra, L. (March 2014). Psychology Graduate School Panel, CSUN, CA.

INTERNATIONAL PROFESSIONAL PRESENTATIONS

Becerra, L.A., Reinert, K., & Higbee, T.S. (2018, September). *Recent Advancements in Activity Schedules.* Naked Heart Foundation Conference, Moscow, Russia.

Becerra, L.A., Pellegrino, A. J., & Higbee, T.S. (2018, June). *Strategies to Teach Prerequisite Foundational Skills to Individuals with Autism*. Efficient Approaches in Education International Conference, Sao Paulo, Brazil.

Becerra, L.A., Pellegrino, A. J., & Higbee, T.S. (2018, April). *The ASSERT Model: Lifelong Benefits of Early Intensive Behavioral Intervention*. Efficient Approaches in Education International Conference, Nizhny Novgorod, Russia.

Becerra, L.A., Pellegrino, A. J., & Higbee, T.S. (2018, April). *Strategies to Teach Prerequisite Foundational Skills to Individuals with Autism.* Efficient Approaches in Education International Conference, Nizhny Novgorod, Russia.

Pellegrino, A.J., **Becerra, L.A**., & Higbee, T.S. (January, 2018). *Tying Assessment to Curriculum.* Presentation for Russian professionals in autism treatment. Utah State University. Logan, UT.

Becerra, L.A., Pellegrino, A. J., & Higbee, T.S. (2018, January). Providing Discrete Instruction to Individuals with Autism in School Settings. Utah State University, Logan, UT.

Pellegrino, A.J., **Becerra, L.A.,** & Higbee, T.S. (May, 2017). *Independent activity schedules*. Presentation for Russian professionals in autism treatment. Utah State University. Logan, UT.

Becerra, L.A., Pellegrino, A.J., & Higbee, T.S. (April, 2017). *Understanding and managing challenging behavior*. Presentation for Brazilian applied behavior analysis graduate students. Utah State University. Logan, UT.

Becerra, L.A., Pellegrino, A.J., & Higbee, T.S. (May, 2017). *Understanding and managing challenging behavior*. Presentation for Russian applied behavior analysis professionals. Utah State University. Logan, UT.

Becerra, L.A., & Higbee, T.S. (2017, April). *Providing Discrete Instruction to Individuals with Autism in School Settings.* Presentation for Russian professionals in autism treatment. Utah State University, Logan, UT.

Becerra, L.A., Garcia,V., & Higbee, T.S. (April, 2017). *Understanding and managing challenging behavior*. Presentation for Russian applied behavior analysis professionals. Utah State University. Logan, UT.

Harris, K.E., Becerra, L.A., & Higbee, T.S. (October, 2015). *Naturalistic teaching and curricular assessment using the verbal behavior milestones assessment placement program.* Presentation for Russian professionals in autism treatment. Utah State University. Logan, UT.

COMMUNITY TRAININGS

Becerra, L.A. & Higbee, T.S. (2018, February). Delivering Group Instruction to Elementary Aged Children with Autism. Granite School District. Salt Lake City, UT.

Becerra, L.A., Lewis, K., & Higbee, T.S. (2018, February). Addressing Challenging Behaviors and Building Compliance. Monthly Parent Educational Training Series, Utah State University, Logan, UT.

Becerra, L.A., Pellegrino, A.J. & Higbee, T.S. (2018, January). Strategies for the Assessment and Treatment of Problem Behavior in Children with Autism and Related Disabilities; Promoting Independence in Individuals with Autism and Related Disabilities. Using Photogenic Activity Schedules. Bear River School District, Garland, UT.

Becerra, L.A. & Higbee, T.S. (2018, January). Verbal Behavior – Milestones Assessment Placement Program (VBMAPP) Assessment in Schools. Granite School District. Salt Lake City, UT.

Becerra, L.A. & Higbee, T.S. (2017, November). Preparing for the Holidays. Monthly Parent Educational Training Series, Utah State University, Logan, UT.

Becerra, L.A., Heaps, A., & Higbee, T.S. (2017, February). Promoting Independent and Interactive Play with Individuals Diagnosed with an Autism. Monthly Parent

Educational Training Series, Utah State University, Logan, UT.

Gerencser, K.R., **Becerra, L.A.**, & Higbee, T.S. (2015, February). Addressing Challenging Behaviors and Building Compliance. Monthly Parent Educational Training Series, Utah State University, Logan, UT.

RESEARCH EXPERIENCE

Graduate Researcher **January 2015 – July 2019**

Autism Support Services: Education, Research, Training, Logan, UT
Advisor: Thomas S. Higbee, Ph.D., BCBA-D

- Designed research protocols.
- Conducted assessments and designed interventions for students with autism.
- Designed individual and agency-wide clinical data collection systems.

Post-Graduate Research Assistant & Supervisor **August 2014 – December 2014**

Fahmie Behavior Analysis Research Lab, Northridge, CA
Advisor: Tara Fahmie, Ph.D., BCBA-D

- Designed protocols and graduate training on behavioral assessments within elementary settings.
- Conducted research in functional analysis and preference assessments.
- Implemented competency-based training and performance feedback to graduate and undergraduate students.

Research Lab Coordinator **August 2012 – August 2014**

Fahmie Behavior Analysis Research Lab, Northridge, CA
Advisor: Tara Fahmie, Ph.D., BCBA-D

- Conducted clinical and research sessions in collaboration with Ventura County Office of Education (VCOE) schools for individuals with and without developmental disabilities between the ages of 3 and 15.
- Designed research protocols, function-based clinical programs, and teacher trainings.
- Trained and supervised undergraduate and graduate research assistants in the implementation of research protocols, functional assessments, and clinical programs.
- Consulted with a teaching team to plan, organize, and implement behavioral procedures.
- Managed administrative activities in close collaboration with Dr. Fahmie.

Research Associate **August 2011 – August 2014**

Children's Institute, Inc., Los Angeles, CA
Supervisor: Todd Sosna, Ph.D.

- Created and maintained participant data collection procedures and databases for foster care and community service multi-site longitudinal studies.
- Conducted extensive literature reviews and created appropriate clinical trainings

for licensed psychologist, social workers, and behavior analysts.
- Supervised program facilitator's and research assistant's data collection procedures.
- Utilize Excel and SPSS software to prepare monthly data quality reports and data analyses.

PROFESSIONAL WORK EXPERIENCE

BCBA Supervisor **August 2016 – July 2019**

Utah State University, Logan, UT

- Provided supervised BCBA hours to Masters and Doctoral students across educational, clinic, and home settings, throughout the state of Utah using face-to-face or online formats.
- Designed and delivered content for the 8-hour supervision training for newly certified behavior analysts.
- Created university supervision documentation, resources, and performance evaluations.
- Coordinated supervision practicum experience hours across clinic and school settings.

ABA Consultant **August 2018 – July 2019**

Granite School District, Salt Lake City, UT

- Supervised two hybrid model classrooms (kindergarten and first – third grade) providing one-on-one, small and large group instruction for children with Autism Spectrum Disorders
- Supervised two preschool autism model classrooms providing one-on-one instruction
- Trained teachers and paraprofessionals in to implement discrete trial instruction and small group instruction
- Programmed curricula and developed behavior plans

ABA Consultant **June 2017 – July 2019**

Nebo School District, Salem, UT

- Supervised a second – fifth grade hybrid model classroom providing one-on-one, small and large group instruction for children with Autism Spectrum Disorders
- Supervised a kindergarten – first grade hybrid model classroom providing one-on-one, small and large group instruction for children with Autism Spectrum Disorders
- Supervised a preschool autism model classroom providing one-on-one instruction
- Trained teachers and paraprofessionals in to implement discrete trial instruction and small group instruction
- Trained teachers to conduct the VB-MAPP and match programming curricula to results

Case Manager & Graduate Researcher **January 2015 – July 2019**
Autism Support Services: Education, Research, Training (ASSERT), Logan, UT

- Conducted skill assessments and designed early intensive behavior intervention curriculum for children diagnosed with autism and related disabilities.
- Supervised and trained undergraduate and graduate employees on implementation of behavior analytic protocols.
- Conducted parent consultations and education trainings regarding a variety of skill acquisition and behavior reduction techniques.
- Designed program wide behavior management strategies for employee performance.

Internal Review Board (IRB) Coordinator **June 2016 – September 2018**
Autism Support Services: Education, Research, Training (ASSERT), Logan, UT

- Coordinated with IRB administration to implement revised and updated protocols.
- Reviewed over 20 IBR graduate submissions for the organizations research.
- Maintained documentation for ongoing IRB submission renewals.
- Trained and coached colleagues through the IRB submission process

Training and Evaluation Coordinator **June 2016 – September 2017**
Autism Support Services: Education, Research, Training (ASSERT), Logan, UT

- Organized international trainings with guests from Brazil and Russia at the masters, professional, undergrad, and doctoral level.
- Created a system of behavioral evaluations to assess and report treatment integrity for case managers and implementers.
- Scheduled and prepared materials for staff trainings at the undergraduate and graduate level.

Behavior Intervention Developer (BID) **July 2014 – December 2014**
Behavior Therapy Clinic (BTC), Encino, CA

- Designed behavior analytic interventions for children diagnosed with developmental delays.
- Supervised fidelity of behavior interventionist implementers (BII).
- Conducted behavioral assessments (e.g., FBAs, DTT assessments, etc.) in homes, schools, and clinics.
- Composed initial intake and annual reports for funding sources.

Lead Behavior Therapy Interventionist **October 2010 – July 2014**
Autism Consulting and Educational Services (ACES), San Gabriel Valley, CA

- Implemented evidence-based behavior analytic interventions to children diagnosed with autism in home and in clinic settings.
- Collected data on child skill acquisition programs, challenging behaviors, and fidelity of parent implementation.
- Assisted in parental support trainings regarding autism, ABA technologies, and

behavior change procedures in a compassionate and thorough manner.

LEADERSHIP EXPERIENCE

ABAI Executive Board Student Representative Elect for the Association of Behavior Analysis International (ABAI), 05/2016 – 05/2019.
UtABA Executive Board Student Representative Elect for the Utah Association of Behavior Analysis, 08/2017 – 08/2019.
Public Relations Coordinator for the ABA Español Special Interest Group, 06/2014 – 06/2015
Vice President and **Research Colloquia Director** for the Student Association for Behavior Analysis (SABA), 08/2013 – 08/2014

MANUSCRIPT REVIEWER

- *Behavior Analysis in Practice*, reviewed article on generalization strategies with ASD populations, August 2019.
- *Behavior Analysis in Practice*, reviewed article on Cultural Adaptations, October 2018.
- *European Journal of Behavior Analysis*, reviewed article on Translating Behavior Analytic Terminology, April 2018.
- *European Journal of Behavior Analysis*, reviewed article on Component Analysis of Discrete Trial Teaching, May 2017.
- *Journal of Applied Behavior Analysis*, reviewed article on Evaluation of Group Activity Schedules to Promote Social Play, May 2017.

ACADEMIC AWARDS & HONORS

Julie Vargas Research Award, California Association for Behavior Analysis, San Diego, CA, 2015
Scientist Practitioner Award, California State University, Northridge, CA, 2014
Outstanding Achievement in Scientific Research, California State University, Northridge, CA, 2014
PsiChi 2nd Place Graduate Research Award, California State University, Northridge, CA, 2014
Graduate Equity Fellowship, California State University, Northridge, CA, 2013

PROFESSIONAL AFFILIATIONS

Utah Association for Behavior Analysis (Student Member), 2015 – Present
Association for Behavior Analysis International (Student Member), 2014 – Present
California Association for Behavior Analysis (Student Member), 2012 – Present
National Latino Psychological Association (Student Member), 2008 – Present